FLIGHT
and The AIRCRAFT ENGINEER

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Editor
C. M. POULSEN

Managing Editor
G. GEOFFREY SMITH

Chief Photographer
JOHN YOXALL

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The Outlook

Record Figures

EVERYONE welcomed Lord Beaverbrook's recent announcement that aircraft and aero engine output during June was more than double the output during June of last year. And his reference to orders placed in America totalling more than a thousand million dollars was impressive, although the *placing* of orders is a simple thing if the customer has the money. But without a knowledge of the British output in June, 1939, it is impossible to form any idea as to whether last month's output was really satisfactory. Sir Kingsley Wood used to be fond of quoting the increase in production as a percentage of that of some earlier period. And *Flight* was rude enough on one occasion to recall to Sir Kingsley the mathematical fact that twice nothing is still nothing.

Lord Beaverbrook's issued statement should be compared with his speech in the House of Lords last Thursday, when he replied on behalf of the Government. The buoyancy of the previous week-end seemed to have evaporated considerably, and a somewhat unwarranted enthusiasm for America had taken its place. Stating that, where aircraft were concerned, "the sky is the limit," the Minister for Aircraft Production said that America had delivered everything promised, and was even a little ahead of schedule. Again, without knowing what the American constructors had promised, it is difficult to assess the value of that statement. That "the imports from America this month will be very considerable, a very handsome programme," sounds well, but the inference is that preceding deliveries had not been very marvellous.

And after his week-end reference to the "more than double" output compared with June of last year, Lord Beaverbrook's picture of home output had suddenly become unaccountably sombre. "Our production at home," he said, "is most severely limited. We are doing everything we can to expand it. It is a difficult and heavy task, but we are facing it with all the ingenuity we can develop. We have no shortage of aircraft at this moment, but, of course, we will need more aeroplanes every day, and we must go on developing that programme as fully as possible. That is why I have been asking for aluminium. I want as much as we can get because we have full use for it in our expanding programme."

Asking the housewife to give up her aluminium pots and saucepans has about it an air of theatrical effect. In practice the housewife finds, when she goes to the shop to buy steel and enamelled ware in order to be able to give her aluminium to the Ministry of Aircraft Production, that she can buy plenty of aluminium saucepans, but not enamelled steel ware. We would suggest that there exists up and down the country quite substantial quantities of scrap aluminium, and that beating our saucepans into aeroplanes is a measure for which the time has not yet come.

Altogether it seems to us that Lord Beaverbrook did less than justice to the British aircraft industry in the House of Lords speech. It is the home industry which still provides the vast majority of our aircraft, and it will be a long time before the ratio of American to British production is altered materially.

Home Defence Authority

IN certain sections of the Press a demand has been voiced for making one person responsible for all the elements of home defence. The Prime Minister has declared that he does not consider the idea a good one, but still the demand continues to be pressed. The fact is that there is in the public mind an uncertainty as to the extent of General Ironside's authority, as to how he

fits in with the Ministry of Home Security, with the Fighter Command of the R.A.F., and with local authorities. Nobody seems clear as to who can order a certain piece of open ground to be obstructed, or who ought to carry out the work. Not unnaturally, it seems most incongruous to the layman that General Ironside, though commanding all the troops who have to defend the country, has no authority over the battalions and brigades of the searchlights and anti-aircraft guns. Though raised by the War Office they work under the Fighter Command.

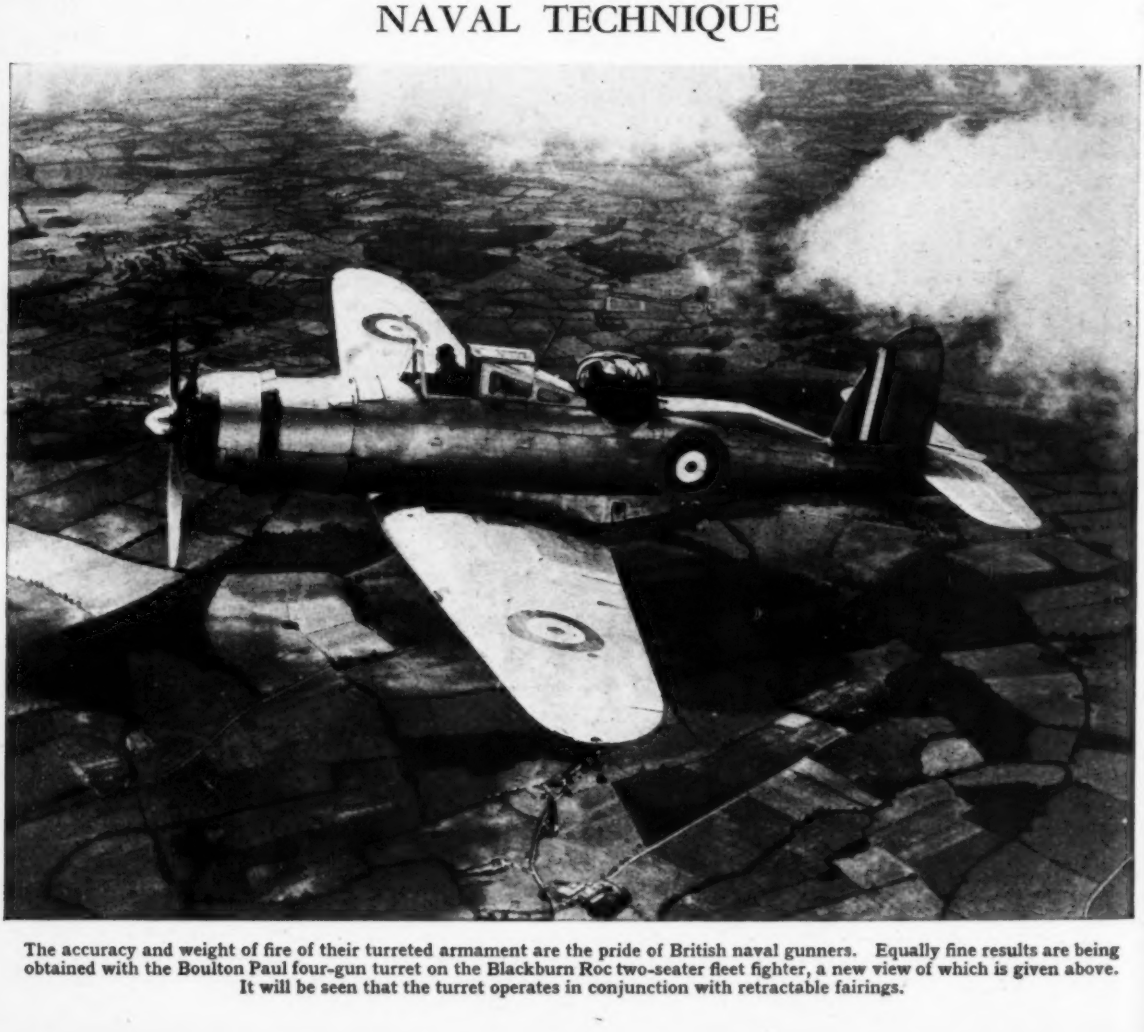
The newspapers which have been writing on this subject have probably only just woken up to the fact that there are anomalies. *Flight* has been giving earnest thought to the matter for years, and long ago came to definite conclusions. Even the present advocates of some alteration would probably admit, on more mature reflection, that all the forces which go to make up air defence must be at least under the operational control of the A.O.C.-in-C., Fighter Command. Of course, we do not mean merely the present holder of that important office, namely, Air Chief Marshal Sir Hugh Dowding. Air defence is the concern of an elaborate organisation with a highly trained staff at the head of it. No other person or body can have such understanding of all the possibilities of air attack on this country and of the powers of air defence to deal with such attack. So long as the enemy is in the air the Fighter Command is the only conceivable body for dealing with the menace. To limit its powers in any way would be to make experiments with our safety at a moment when to experiment would be an unjustifiable gamble.

Men in Khaki and Men in Blue

IF and when any bodies of the enemy land in this country, then the time will have come for General Ironside and his Army to deal with them. If he needs more authority to order the obstruction of open spaces or to utilise the Local Defence Volunteers, by all means let him have the necessary powers. But, as we value our lives and liberty, do not let any well-meaning but thoughtless laymen interfere with the Fighter Command.

The present confusion of thought would have been avoided if long ago we had taken the sensible step of placing all the searchlight battalions and anti-aircraft brigades under the Air Ministry for all purposes. Whatever may happen, those troops are not intended to fight Germans on the soil of Great Britain, whether they may come by air or by water. That is for the men in khaki under General Ironside. Therefore, the men who fight only against the enemy in the air ought not to be wearing khaki; they ought to be in Air Force blue, as the men of the Balloon Barrage are. If that had been arranged long ago we should now be spared much muddled thinking.

NAVAL TECHNIQUE



The accuracy and weight of fire of their turreted armament are the pride of British naval gunners. Equally fine results are being obtained with the Boulton Paul four-gun turret on the Blackburn Roc two-seater fleet fighter, a new view of which is given above. It will be seen that the turret operates in conjunction with retractable fairings.

WAR in the AIR

THE UNCEASING VIGIL. An Avro Anson flying over ships of the Royal Navy. In co-operation they have given the enemy submarines a poor time.

A Busy Week : Wide R.A.F. Raids : Our Fighters' Success

PROMINENT among the air events of the past week have been great air battles over the English Channel, further action to prevent the French Fleet from falling into the hands of the Germans, a naval fight in the Mediterranean in which the Fleet Air Arm played a prominent part, an attack by the F.A.A. on Italian warships in Sicily, many more raids by our aircraft on objectives on the Continent, and further fighting in North Africa.

The German bombers have been taking liberties by crossing the coasts of Great Britain in greater numbers by daylight. This has given our defences a better chance and, consequently, our victories have mounted in a most gratifying manner. On Sunday, July 7, eight German machines were shot down; on Monday, 8th, eight; on Tuesday, 9th, nine; on Wednesday, 10th, 14; on Thursday, 11th, 23, and on Friday, 12th, 11. These records only apply to victories definitely confirmed; many others contrived to get out of sight in such a condition that they seemed very unlikely to get back to their bases. Of course, the bombs dropped did some damage to civilians, but little or none to military objectives. On Thursday evening, for instance, about a couple of dozen bombers flew over a town in the South-East and dropped fifteen H.E. bombs. A number of working-class houses were demolished, a police station was partly wrecked and a constable in it was killed, some people were killed in an A.R.P. post, and another bomb made a direct hit on a First Aid post, killing all the people inside. Ten people inside an Anderson shelter were unharmed, although a bomb fell sixteen feet away from it. But of many of the murderers it can be said, in the words of the Highland poet, "Be it so; from that foray they never returned."

The greatest air battle took place on Wednesday, July 10, though fighting was in progress pretty well all that day. A large force of German bombers, escorted by a strong force of 50 Me fighters, tried to bomb a shipping convoy in the Channel. Hurricanes attacked the bombers, and the escort put up a heavy barrage of fire. The bombers hurriedly discharged their bombs, which missed all the ships, and then made off for the coast of France. Meanwhile, their escort had engaged our fighters, but the latter elimbed up to meet them, and before long showed their mastery. About the same time, some Spitfires found a concentration of about 70 German machines flying at heights from 6,000 to 12,000 feet. They attacked, set two Me 110s on fire, shot away the tails of two more, put bursts into another couple, and saw a Me 109 spinning down towards the sea. All day long the fighters kept coming home to refill and recharge and always brought in the same tales of attacking superior numbers and securing victories. We only lost two fighter machines that day (and one of the pilots came down safely) against 14 of the enemy. Twenty-three other German aircraft were badly shot about.

A.A. Guns' Good Work

NEXT day, Thursday, 11th, our defences did still better, destroying 23 German machines before midnight, in addition to knocking many others about so badly that they were probably destroyed. On that day three enemy machines were shot down by our A.A. guns, and it is gratifying to record their successes. Evidently their shooting is improving with practice, and will improve still further the more targets the enemy is pleased to provide. One gun battery on the South coast on a recent occasion had a 30 seconds spell of "action," fired off eight shells, and shot down one

WAR IN THE AIR (CONTINUED)

German machine. Here is the story from the battery log book:—

13.12 hours. E/A seen 8,000ft.
13.14 hours. Opened fire on E/A range 6-7,000yds.
13.14½ hours. Cease fire. Enemy has disappeared.
13.25 hours. Enemy reported in sea.

There was plenty of cloud over the Channel when a number of enemy aircraft were spotted coming across a patch of blue in the sky. Height and range-finders were set and the guns opened fire. The enemy aircraft turned tail; one fell into the sea, and "cease fire" was given. Four 3.7in. guns fired one round each and two 3in. guns fired two rounds each. As firing ceased, Spitfires were hot on the tails of the escaping enemy fighters. R.A.F. fighter pilots and naval observers told the gunners of their success.

As the guns do not kill so many German aircraft as the fighters do, we are rather apt to suppose that the German pilots regard them with contempt, and, like our own airmen in 1914, may feel inclined to quote the German equivalent for the musical comedy song of those days, "Archibald, certainly not!" From that song, by the way, came the familiar nickname of "Archie" for the A.A. guns. However, the Germans themselves do not all look on our Archies with contempt, as witness the following extract from the report of one of H.M. minesweepers:—

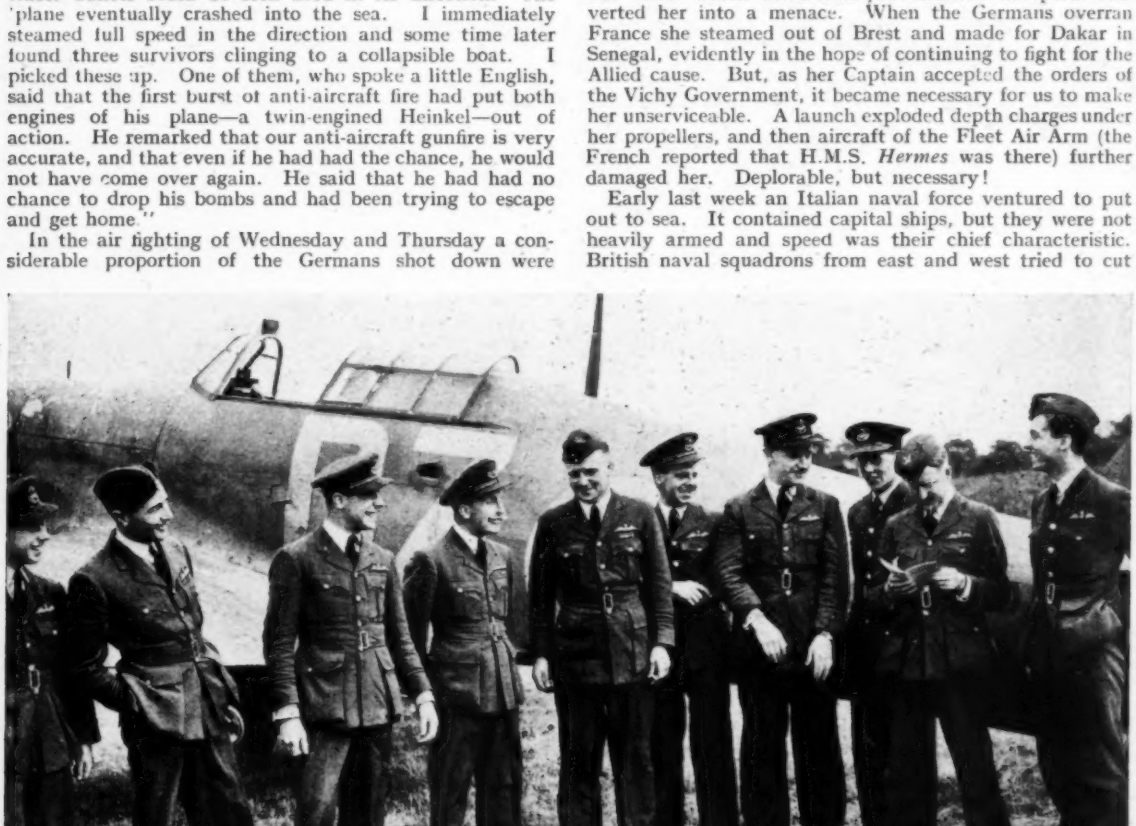
"At approximately 0140, I saw an enemy aircraft in the beams of several searchlights over the coast. Anti-aircraft gunfire was exploding all round it. A few minutes later, I saw that the machine was rapidly losing height and tracer bullets could be seen fired in its direction. The 'plane eventually crashed into the sea. I immediately steamed full speed in the direction and some time later found three survivors clinging to a collapsible boat. I picked these up. One of them, who spoke a little English, said that the first burst of anti-aircraft fire had put both engines of his plane—a twin-engined Heinkel—out of action. He remarked that our anti-aircraft gunfire is very accurate, and that even if he had had the chance, he would not have come over again. He said that he had had no chance to drop his bombs and had been trying to escape and get home."

In the air fighting of Wednesday and Thursday a considerable proportion of the Germans shot down were fighters. The plan of trying to give their bombers a free run in by sending escorts of fighters to engage the attention of our bombers has at last been definitely put into practice. So far as can be judged from the official reports, which are naturally scrappy rather than analytical, these tactics did not prove a brilliant success. It is true that a certain number of bombers crossed our coasts and committed a certain number of murders on civilians. Whether they came in by evasion or as a result of the Messerschmitts holding off the defenders does not clearly appear, but the former seems the more probable. Because there are fighters up above, it does not by any means follow that all our own fighters will leave the bombers alone to go their own sweet way. A section of the defenders will take on the escort, while others will continue to assail the bombers. Such is the spirit of our fighter pilots, and such their confidence in the superiority of their machines, that odds mean nothing to them, and they will without hesitation attack any number of Germans, whether fighters or bombers. Nearly all of them are fighting for their own home land, knowing that if they let a bomber through it may kill or harm their own dear ones. That thought adds fury to their natural fighting spirit, and the invaders find them terrible foes.

Fleet Air Arm Work

IT seems a very short time ago that there was Allied rejoicing over the commissioning of the French battleship *Richelieu*. With her eight 15-inch guns she was a great reinforcement to Franco-British naval strength. The armistice terms which the Pétain Government accepted converted her into a menace. When the Germans overran France she steamed out of Brest and made for Dakar in Senegal, evidently in the hope of continuing to fight for the Allied cause. But, as her Captain accepted the orders of the Vichy Government, it became necessary for us to make her unserviceable. A launch exploded depth charges under her propellers, and then aircraft of the Fleet Air Arm (the French reported that H.M.S. *Hermes* was there) further damaged her. Deplorable, but necessary!

Early last week an Italian naval force ventured to put out to sea. It contained capital ships, but they were not heavily armed and speed was their chief characteristic. British naval squadrons from east and west tried to cut



COMMAND PERFORMANCE. Some pilots of two Hurricane formations of the R.A.F. Fighter Command who, meeting seventeen enemy aircraft over France, shot down five and damaged a further seven.

WAR IN THE AIR (CONTINUED)

A Messerschmitt Me 109 single-seater fighter which made a crash landing in South-East England last week. This picture shows how "dirty" the Me 109 is in comparison with the Hurricane and Spitfire. Note particularly the deep troughs for the fuselage guns.

the Italians off, but had not the speed to do so. Very wisely, the enemy made no attempt to fight, but turned for their harbour and did the naval equivalent of opening their throttles to the full extent. This was not cowardice, but ordinary prudence. None the less, a 15-inch shell from one of our big ships hit one of the Italian battleships at extreme range, and caused some 100 casualties. The T.S.R. machines of the Fleet Air Arm took up the chase, and successfully planted a torpedo in one of the Italian cruisers. Meantime, the *Regia Aeronautica* had gone out in some strength to attack our western naval force, and the Italians claimed to have sunk the *Hood* and the *Ark Royal*. Poor *Ark Royal*! She is always being sunk by air bombs. Actually the Italian bombs all missed and did damage to neither ships nor men, while the fire from our Fleet shot down four Italian machines and badly damaged seven others, three of which probably came down in the sea.

Though the Italians do not believe that the Mediterranean is the proper place for aircraft carriers—and in theory they may be right—the F.A.A. has been very active in the inland sea. Some of its machines have combined with the R.A.F. in attacking Italian warships in the harbour of Tobruk, Libya, others raided the aerodrome of Catania, in Sicily, and set hangars and workshops on fire, while an attack was made on the harbour of Augusta, Sicily, where a destroyer and the hulk of a store ship were sunk, perhaps by torpedo, though that is not stated.

Malta has evidently been taken under the wing of the Middle East Command, as reports of actions there are now issued from Cairo. Raiding continues, but the fighters on the island have been increasing the number of their successes, and the place has not been obliterated, as Italians had foretold that it would be within a few weeks of their making war.

"Morituri Te Salutamus"!

FURTHER reports have now been received of the great dog-fight between six Gladiators and nine Italian fighters near Sidi Barrani, on the frontier of Egypt and Libya. The Gladiators went over the enemy aerodrome and deliberately waited for the enemy to take off and prepare to attack. When six were in the air the young Flying Officer leading the first section—a Londoner who has only been in the service for two years and a half—gave the signal to attack. He shot down four of the enemy himself, three bursting into flames as they struck the ground, the other falling to pieces as it crashed. His flight sergeant got two; the third pilot had a long dog-fight but eventually saw his opponent diving headlong to earth out of control. In the meanwhile more enemy fighters had taken off and the other R.A.F. section went into action. The leader sent the nearest Italian down in flames and another of our pilots chased an escaping enemy until he had shot him down. One of our aircraft was damaged but the pilot baled out and landed safely on the Egyptian side of the frontier, where he was picked up by Army units who had been excitedly watching the fighting.

Gladiators did good work for the Finns, and they made a heroic but hopeless attempt to establish themselves on a frozen lake in Norway so as to hold off the German bombers. Now at last these fine biplanes have really come into their own. It must be admitted that when it is a case of chasing Junkers 88 bombers our fighters need the greatest possible speed, but in a dog-fight against other fighters speed is of less account, and the wonderful manœuvrability of the Gladiator biplane is a great advantage.

Determined Bombing

WHILE the doings of our fighters and the Fleet Air Arm have perhaps attracted most attention during the last week, the implacable work of the Bomber and Coastal Commands has gone on unchecked. In recent reports there have been several mentions of bombing barges in the canals of Holland. It may be that these are hints of preparations for the invasion of Great Britain. There is nothing so useful as killing the wasps in their nests. Kiel and Wilhelmshaven have been bombed again, and places in Norway and Denmark have received attention, as well as the regular targets in Germany. Two warships, either destroyers or light cruisers, were set on fire off Wilhelmhaven by our bombers on Monday, July 8. On the same day a very smart daylight raid was made by Blenheims of the Coastal Command on the Leopold Basin at Ostend, which is now used as a base for German supply ships. Its name made a raid on it a particular pleasure. The raid came as a complete surprise. It lasted only four minutes, but great damage was done to the dock gates, a direct hit was made on a large German supply ship at anchor, and many fires were started. The bombers were flying out to sea again almost before the Nazi defences got into action.

A raid on the Sola Aerodrome at Stavanger, where aircraft lined up were attacked by our bombers, was a fierce affair. We lost seven bombers, though we shot down one German fighter. One of the bomber pilots who took part in the raid told the following story: "I arrived over target in company with other flights of aircraft. Owing to intense anti-aircraft fire over target, my flight became detached from the leading flight, and I did not see it again. Each of the three aircraft in my flight dropped its bombs. There was no opportunity to observe the result owing to having to take avoiding action. I saw that the port aircraft of my flight had most of its rudder blown away, presumably by anti-aircraft fire. On leaving the target, the flight was still intact. Saw also three Blenheim aircraft

WAR IN THE AIR (CONTINUED)

of another squadron ahead, flying west. Endeavoured to join up with them for mutual protection, but before this could be done enemy aircraft in large numbers were attacking, about 30 in number, mostly Messerschmitt 109s, joined later by three or more Messerschmitt 110s. The flight ahead took such violent avoiding action that my flight could not keep with them. While repelling formation attacks of enemy aircraft, the rear gunner of the port aircraft was killed, and the aircraft was subsequently shot down in flames. The aircraft on the starboard side was shot down in flames soon after the signal 'engines on fire.' My aircraft again tried to join up with the flight ahead, but the starboard engine and oil tank were hit by cannon fire, the engine seized and died, and the airscrew and reduction gear dropped off. The attack by enemy aircraft lasted for over 30 minutes after leaving the target, including two attacks by two Messerschmitt 110s while in the clouds well out over the sea and after the starboard engine seized up. I continued on the course for home, and, owing to lack of petrol, was considering landing beside some minesweepers when the coast line became visible. Made forced landing at coastal aerodrome, when the undercarriage jammed in the 'up' position. All the hydraulic system had been put out of action during the fight with the enemy. The air observer, during the action with enemy fighters, shot down one Messerschmitt 109, and possibly damaged several others. The rear gunner damaged one Messerschmitt 109. His gun was put out of action by explosive bullet from which he received slight damage to one eye."

Mr. Churchill's Broadcast

THE Prime Minister delivered a stirring broadcast to the nation on Sunday evening, July 14, in the course of which he said: "This has been a great week for the Royal Air Force and the Fighter Command. They have shot down more than five to one of the German aircraft which have tried to molest our convoys in the Channel or ventured to cross the British coastline. These are, of course, only the preliminary encounters to the great air battles which lie ahead; but I know of no reason why we should be discontented with the results so far achieved, although we hope to improve upon them as the fighting becomes more widespread and comes more inland."

The First Lord of the Admiralty, Mr. Alexander, broadcasting the day before, was rather more detailed. He said that in the previous eight days 90 enemy aircraft had been shot down for certain by the Air Force and A.A. guns, and, in addition, 50 more had probably been destroyed. It is also gratifying to note that since Italy entered the war 94 of her aircraft have certainly been destroyed, 28 most probably lost, and a further 31 damaged.

Over the week-end the R.A.F. was particularly busy in both attack and defence. The number of raids which the Bomber and Coastal Commands can now manage in a single night is most impressive. On Saturday, 13th, and Sunday, 14th, no fewer than 14 enemy aerodromes were attacked, in addition to numerous raids on barges, communications, and munition works.

The Fighter Command had good days also. On Friday, 12th, the defences shot down 11 German machines. The first victory of the day was won by six Hurricanes patrolling off the East Anglian coast. They saved merchant ships from an attack by 10 Heinkels, four of the enemy falling into the sea. A little later two Dornier 17s tried to attack the convoy, and a single Hurricane shot down one and damaged the other. Three Dornier 17s which attacked shipping farther south were also unlucky; a Wing Commander in a Hurricane sent one down in flames. His own aircraft was hit in several places, but he landed safely. About mid-day Heinkels were being attacked both in the North of Scotland and over the South Coast of England. Spitfires shot down a Heinkel 111 over Aberdeenshire, and anti-aircraft gunners on the South Coast got another, which crashed on land. Another Heinkel when attacked jettisoned its bombs over the sea, but a Hurricane pilot got in a long burst of machine-gun fire. Then there was an explosion in the Heinkel. "It literally smothered me in oil," he said, but the Heinkel pilot handled his controls well. Bits and pieces were flying off it all over the place. He landed in a grass field with only one wheel of his undercarriage down, and that was the end of that. The last German, a Junkers 88, also a shipping raider, was claimed by Hurricanes off the Hampshire coast later in the afternoon. It was intercepted under a bank of low cloud and crashed into the sea. Two of our fighters were lost during the day.

On Sunday, 14th, the A.A. guns secured the first success within a few minutes, getting a direct hit on a Junkers flying level far above them. They did not see it crash, but a neighbouring gun crew let them know. One patrol of Spitfires shot down four of the six enemy aircraft known to have been destroyed by fighters. These four were Ju 87 dive bombers. Two Me 109 fighters were destroyed by a patrol of Hurricanes. The first Me 109 was shot down by the Squadron Leader. After a long burst it flicked over on to its back. The Squadron Leader continued to fire. Still upside down, the Messerschmitt dived steeply and crashed.

Meanwhile another enemy fighter was doing its best to get on the tail of the Squadron Leader's Hurricane. But it, in turn, was being attacked by another British pilot. After one long burst from the latter's machine gun there was an explosion in the Messerschmitt. This, too, dived steeply to its end.

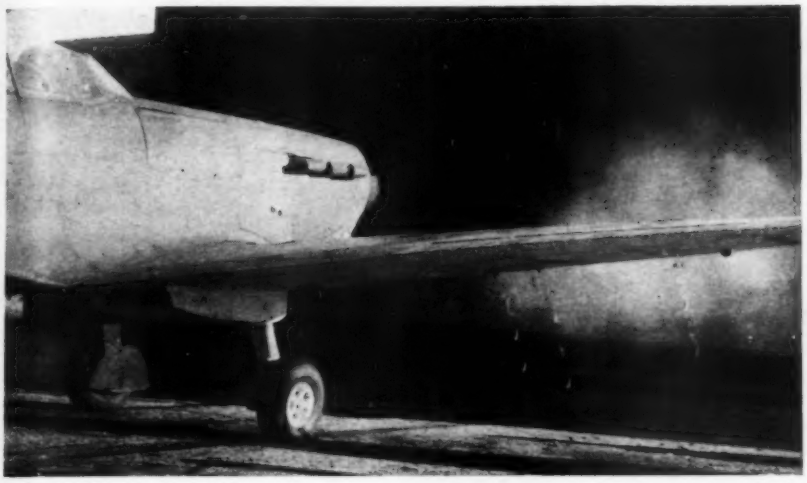
A pilot from another formation of Spitfires went after a third Me 109, got in two bursts, and saw it go down enveloped in smoke. It may have been destroyed, but the Spitfire pilot was too busy attacking another enemy fighter to watch it further. This aircraft is therefore not claimed officially.

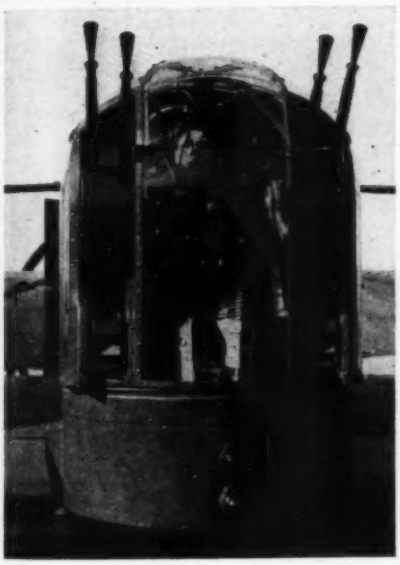
Five bombs were dropped in the south-east on Sunday night by a lone raider flying at a great height. Buildings were shaken, but apparently no damage was done.

A Legless Pilot

AN extraordinary fact about the week-end fighting was that one Dornier 17 was shot down into the sea by a fighter pilot with two false legs. His name has not been officially mentioned, but there is no doubt that he is F/O. D. R. S. Bader, who some years ago was a first-class fly-half at Rugby football. He used to play for the Harlequins and for the R.A.F. XV. The story of this pilot's return to flying when war broke out is unique in the records of the Royal Air Force. Originally he passed through Cranwell, where he was known as a fine games player. He was captain of cricket and might have played for his county. Soon after he had been commissioned in the R.A.F. he lost control when flying over his aerodrome and crashed heavily. It was thought by all who saw the crash that the pilot could not possibly be saved. But he was got out at last, and, in the words of a friend, "refused to die." He woke up from a long period of unconsciousness to find that both legs had been amputated, one completely and the other at the knee. After being invalided out of the Service he became more and more skilful in the use of his metal legs. When war broke out he argued his way to an R.A.F. Volunteer Reserve Medical Board and insisted that he was fit for flying. The President of the Board was so impressed by his enthusiasm and determination that he persuaded the doctor to send him to a Central Flying School for a test. He passed the test with flying colours and was passed for active service with a Fighter Squadron. At first he was flying Spitfires, and has always said that he can get in and out of his machine quicker with his artificial legs than other pilots with their real ones. A few months ago he was taking off when his engine failed and he had a mild crash. Both his metal legs were badly bent, but an artificer straightened them and half an hour later he was up in the air again. Now he is leading a squadron of Canadians.

ALL TO ONE END





Whether the practice is with an 8-gun fighter at the butts, a bow and arrow in a convalescent hospital, a four-gun turret in the tail of a Whitley, a Browning on the machine gun range, or a camera gun in a dummy turret, it is all aimed at the result shown in the bottom right hand corner.

POTENTIAL SERVICE EQUIPMENT

On this page are illustrated three types of American fighter which may conceivably be seen in this country before very long. At the top of the page is the Curtiss P-40 with an Allison vee-twelve liquid-cooled engine.

The radial-engined fighter seen from above is the Brewster, with Wright Cyclone. Four guns are carried.

Finally there is the twin-engined Grumman Skyrocket for which is claimed an extremely high rate of climb. It appears that the fuselage has deliberately been kept short in the nose to permit the close grouping of the engines and airscrews. Armament is carried in the nose of the fuselage.

Air Strategy—XI

AIR BLOCKADE

What are its Possibilities and Difficulties?

By CAPTAIN NORMAN MACMILLAN, M.C., A.F.C.

THE idea of an air blockade is new, in the sense that it has never been tried out. But the present war represents the first opportunity which has arisen to put this new conception of the art (*sic*) of war to the test. So far its employment has been of a desultory character, for most of the air forces of both sides have been engaged upon air operations of a more pressing combatant nature. The phase upon which the war has now entered, however, makes for conditions under which an attempt to apply an air blockade becomes a far from remote contingency.

Before proceeding to examine the possibilities that lie in any attempt to impose an air blockade it will be advisable to reach some kind of definition of what is meant by "air" blockade.

The Concise Oxford Dictionary defines "blockade" as: "Shutting up, total or on land or sea side, of a place by hostile forces in order to starve it into surrender or prevent egress and ingress."

Now, within that definition, one could, by adding the word "air" after the word sea, get a definition of air blockade. But that definition would only imply the prevention of the egress and ingress of aircraft from the place blockaded. It would be an aircraft blockade. It could not, of itself, cause the surrender by starvation of the beleaguered nation or garrison; except in special circumstances, as, for example, when a small force, being cut off, becomes dependent upon aircraft as the means of obtaining supplies. Because a great many people see in air blockade nothing more potent than that which is indicated by adding the word air to the dictionary definition of blockade, they dismiss its possibilities (I think) too lightly.

Germany's War Strength

War is made up of surprises. The present war has had its full quota already. Both the French and British Staffs underestimated the strength of the German war machine in numbers of aircraft and tanks. But it has been said since the German offensive broke through the Western Front that there was nothing new in the German equipment, and that the one new feature was the technique of the employment of the large air and armoured land forces. If the technique was a new feature, it came as a surprise only because the Staffs had refused to credit the Germans' real strength in the forces they possessed. Had they had the gumption to believe what others believed they would have looked for the reason, and the technique would not have come as the surprise it did. But, because they did not believe the basic reality of numbers, their assumptions of the methods of war proved to be faulty; the resulting failure to provide sufficient equipment to meet the new technique of mobile land war has been and must continue to be costly.

That object lesson is given merely to show the unwisdom of rigid ideas in war. And there could be no greater unwisdom than to assume that the methods of air blockade must be akin to the methods of sea or land blockade. It would be equal folly to dismiss the dangers of air blockade too lightly.

The difficulty lies in the use of the word "blockade." Yet there is no other that fits quite so well. So we must use it. Unless we coin a new word, say, blockair. The meaning of sea and land blockade is appropriately defined by the dictionary. And, according to that definition, we have a sea blockade in continuous operation; but now no land blockade of Germany exists.

Germany has against us no sea blockade; but she has a partial land blockade in operation against us so far as certain sources of supply from Europe are concerned. (I am discounting the U-boats, which have been singularly unsuccessful. In this respect the Naval Staff made no mistake.)

Hampering Supplies

Can air blockade make up for the deficencies of the existing blockades which are now in operation by either side? Or how far can it implement them? Answers to these questions deserve, and have no doubt received, close scrutiny by the British officers and officials whose duty it is to deal with such matters.

The only official pronouncement to indicate that Britain is employing her air forces to the ends of blockade was made in a broadcast by Sir Philip Joubert. He said that there was information to show that the bombing attacks of the R.A.F. were seriously hampering the supply arrangements of the German army of occupation in France. He made it clear that he did not suggest that the operations were placing the German army of occupation in jeopardy; but they were making things difficult for them. That statement is a straw which shows how the wind is blowing.

Let us take the picture of Germany first. Whatever she may be able to improvise in the territories she has occupied, her armies must be supplied in the main, at least for some time to come, from Germany. Those supplies must be transported by railway, road, canal and coastwise shipping. The Navy can deal only with the coastwise shipping method; and that such operations may be fraught with grave risks was clearly shown by the operations during the month of the Norwegian campaign. We have no land forces on the mainland of Europe to cut the other lines of supply. How far can the air force cut them? Clearly that depends upon the strength of the air force available to us. And it depends, too, upon how far we have gained the mastery of the air.

Mastery of the Air

Naval blockade depends for its success upon the mastery of the sea. The British Navy secured the mastery of the sea from the very beginning of the war because it had the supremacy of strength. Had the R.A.F. possessed the same proportionate strength *vis-à-vis* the *Luftwaffe* as the British Navy possessed *vis-à-vis* the Germany Navy, we should have been able to secure mastery of the air also from the beginning of hostilities. (Indeed, under such conditions, it is open to question whether hostilities would ever have broken out.) As things are, however, we have not got the supremacy of numbers of aircraft, and until we have built up the Royal Air Force to a strength commensurate with our needs it will not be possible to apply the maximum air pressure against Germany in the form of blockade.

Herein lies the explanation of the fact that we have not been able to place the German army of occupation in France in jeopardy. What might we not have done had our air force had the measure of strength possessed by our Navy? It was to preserve that all-important strength ratio that the British Navy took action against the French.

So it appears at the moment that we cannot apply the full force of air blockade measures against even one German army of occupation, that in France. And there are six other such armies of occupation in Belgium, Holland, Denmark, Norway, Poland and Czechoslovakia. Clearly, then, the main British air effort must be directed towards the most rapid means to gain ascendancy in the air. For, taking the parallel of the sea, ascendancy ot power is a pre-requisite to the successful application of blockade measures.

To gain supremacy in the air the R.A.F. must be employed, as frequently as may be possible, to cut down the production and employment of aircraft for the German and Italian air forces by attacking the most vital sources of supply of materials and oil. This must include not only new supplies, where possible at source, and during delivery, but also the storage places for Germany's reserves for manufacture. Simultaneously, every effort must be made by Britain to increase the output of aircraft (complete with all equipment) from factories which are safe from air attack.

Output

The relative success of the British air attacks against German sources of supply for the *Luftwaffe*, and those of the *Luftwaffe* against the British sources of supply for the Royal Air Force, will largely determine the length of time necessary for the Royal Air Force to gain the mastery of the air over the enemies of Britain. Bound up with the time factor is the output of aircraft from the two sides, the output of pilots and other members of crews, the output of trained personnel for ground duties both to-day and during the continuation of hostilities under the forms of attack which may be devised by both sides to the conflict. In the long run, the time factor ought to be in favour of Britain, for aircraft for the R.A.F. can be built (and are being built) in factories which are far outside the reach of bombers of the enemy.

The difference in the sources of supply of Britain and of Germany and Italy must make a difference to the technique of air blockade as practised by one side and the other. British air blockade cannot hope to snatch victory for Britain until the weary process of building up air supremacy has been completed. This process, difficult enough in time of peace, is far more difficult in time of war in a country within striking distance of enemy bombers. The dual need for the output of attack-free factories is certain to play an increasingly vital part in the struggle for air supremacy.

It is regrettable, therefore, that the circumstances of the moment demand the deflection of a part of the R.A.F. to the duty of interfering with the supply arrangements of German armies of occupation. And, no doubt, too, the R.A.F. is concerned regularly with the recognition, location and attack of concentrations of enemy forces which may be gathering to the attack of the British Isles. Both these duties necessarily detract from action which the R.A.F. might take towards the reduction of the future supremacy of the *Luftwaffe* by means of air blockade waged against the factories which supply the *Luftwaffe* and the *Regia Aeronautica*. Britain urgently needs the creation of a separate force of bombing aircraft charged with the sole duty of attacking the sources of the enemy supply of aircraft.

In the meantime, Germany, with her air superiority in numbers (but not in efficiency of aircraft or personnel), can direct her whole energies towards the single purpose of air blockade of Britain, combined with direct attack in support of land forces both air- and sea-borne. For none of the British air units outside Great Britain can attack Germany. And so Germany's air methods against Britain are likely to be directed towards defeating the objects which I have set out above as being those towards which Britain must move relentlessly.

Thus Germany will strive with all her might to force a conclusion to hostilities before Britain can achieve the air supremacy which will spell the doom of the Axis Powers.

Whatever may result from any attempts which Germany may make to invade the British Isles, it is certain that her air forces will be employed on the grand scale to cause the maximum confusion, to slow down the working of the war production effort, to dislocate communications and the transport of supplies. Her air attacks will have the effect of blockade activities by other methods. Instead of the cutting off of outside supplies, as is the time-honoured method of sea war, her air blockade will be directed to cut off internal supplies by a process of disruption.

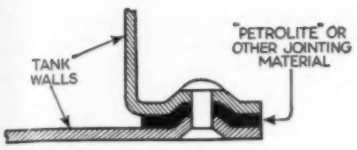
It is that process which Britain must defeat. It is not enough to have squadrons of fighters to shoot down bombers. It is not enough to have squadrons of bombers to bomb factories making aircraft in Germany. We must have also a super-excellence of internal communications in Great Britain so that under all circumstances communications will be maintained. By that successful internal organisation the mobility of the island defences will be secured, the food resources assured and the productivity of the factories maintained at the highest point.

And if Germany's attacks upon Great Britain fail, as assuredly they should fail, there will remain to her only the method of air blockade—waged in the hope that she may be able to weaken us too much before our air strength grows greater than her own. That blockade, unable to affect the air strength derived from factories far overseas, will be flung against us to attempt to starve us by cutting our communications internally at every point possible between the ports and the factories, the factories and the shops, the farms and the home, the markets and the retailers.

Internal Communications

It will not be blockade in the accepted sense of the word. But its effect may be as pronounced if we are not prepared to meet it at every point and defeat its power. Just as our recent air attacks have been of effect upon the German armies of occupation in France, so would German air attacks have effect upon the British armed forces and the British public if they severed too many of our communication links and kept them cut. That is the real purpose of air blockade. And this war will give an answer to the question which has been uppermost in the minds of many thinking men and women for years. That question is, can the methods of the air rival the methods of the sea in the same time or in less time?

The answer at sea has always been superiority in numbers, or technique of seamanship, or courage, or a combination of such assets. Not always with the British Navy has success been gained by numbers. The answer in the air will be written in the same way—numbers, airmanship, courage. At the moment we have the last two. As soon as we add the first the end of another victorious war for Britain will be in sight. Until then we shall have to bear the rigours of air blockade.



Section through a joint of the De Bergue riveted type.

AIRCRAFT FUEL SYSTEMS

Multiple Tanks and Cross-feeding : Avoiding Vapour Locks : Short Pipe Runs : Minimum Suction Head

By J. HAWORTH

IN modern aircraft the design of an efficient fuel system has become a major problem. Several factors have an influence on the problem. Among them are operation at high altitudes; rapid rate of climb, etc.; use of fuels of high volatility; number of tanks; their disposition; cross-feeding; tank design; piping layout, etc. All these have contributed to make the design of a fuel system a complex problem, by no means easily solved. The writer, therefore, proposes to discuss each of these points as follows:—

(a) Number and disposition of fuel tanks; (b) tank design; (c) layout of pipes; (d) cross feeding; (e) safety considerations.

Number and Disposition of Tanks

The range and type of aircraft have a very important bearing on the size and number of tanks required, depending, of course, on fuel consumption—proposed performance. In the case of military aircraft the required tankage is estimated from information given in the specification appertaining to the particular aircraft. The tankage of a civil craft will be decided upon in relation to required payload to be carried and probable length of flights between refuelling points, plus consideration of a factor to allow for extra petrol consumption during inclement weather.

These factors having been determined, the most suitable space available for tankage space must be decided upon. In the case of a civil aircraft the tanks will most probably be fixed in the wings, as all fuselage space will be occupied by payload. Another desirable feature is that the tanks should be placed as far outboard as reasonably possible, in order to minimise fumes from the fuel becoming unpleasant to passengers and crew, and also as a precaution against fire. On long-range military aircraft, designed for offensive duties, it is preferable to have several tanks (for reason see Crossfeeding), and during the choice of their positions consideration must be given to space available, accessibility for ease of repair and maintenance, weight and disposition in relation to the engines.

It is desirable to position the tanks so that the suction head on pipe lines feeding the fuel pump is a minimum (the reason is discussed under Pipe Layout). Therefore it will be observed that the nearer to the engines the fuel tanks can be placed the higher will be the efficiency of the fuel feed system.

Tank Design

Many different methods of constructing fuel tanks have been tried. The most difficult problem to be overcome is ensuring that the tank will be perfectly petrol-tight under adverse conditions, i.e., shock loads caused by bad landings, distortion due to wing flexure, etc. It will be realised then, that if an adequate method of forming the joints in the tank can be decided upon, the tank will withstand most of these conditions. The intelligent use of anti-vibratory and shock-absorbing mountings will effectively reduce some of the adverse conditions, but others, such as the loads caused by surging within the tanks, will still remain. Surging can be partially obviated by suitable baffles within the tank, and the same baffles can be used to eliminate the panting of large flat surfaces, such as usually form the walls of fuel tanks.

A well-proved type of construction comprised a tank made from aluminium sheet, welded at all joints. This method of construction has been general for many years, but recent developments in the riveting of sheets to make a petrol-tight joint have become so satisfactory that the riveted type of tank has superseded the welded type. The fact that Dural sheet can be used has resulted in employing a thinner gauge than with aluminium. This has been useful in that tanks can be made much lighter for a given capacity. The most popular method would appear to be the De Bergue process.

Of recent years tanks have been designed to form the actual wing itself, thus gaining a maximum capacity for a given wing space. Many difficulties are, of course, encountered, as the tank must be stressed and designed to stand loads imposed on the wing during flight. In the case of a tank forming the leading edge of a wing this is easily taken care of, but the problem is not so easily solved when the tank runs from leading edge to rear spar. Then the tank must be designed to carry all the bending and torsion load imposed on that section of the wing. Whilst the problems encountered in the design of such a tank are by no means insuperable, it is not so easy to allow of the tank being removed easily and quickly for repairs or maintenance work.

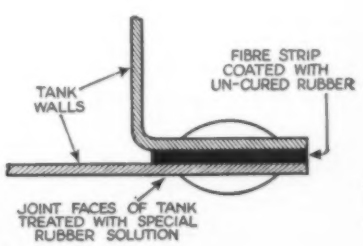
In another method of joint design a strip of rubber is laid between the two sheets forming the tank, and the whole joint is then riveted up. The tank, when finished, is passed into an oven where it is slowly "baked" for a determined period. During and after this baking, the rubber swells and develops a permanent enlargement. The swelling of the rubber causes a pressure to be exerted on the sheets forming the joint, thus ensuring a perfectly sound petrol-tight joint. Tanks constructed under this process have passed all the rigorous Air Ministry Tests satisfactorily.

Layout of Pipes

The layout of the piping has a great bearing on the efficient operation of a fuel system. Every effort should be made to secure as good a pipe run as possible. The number of tanks, their disposition in relation to the motors they serve, and the use of cross-feeding, all add to the problem.

The designer should ensure that there is absolutely no possibility of vapour locks forming within the pipes, and with this end in view all inverted "U" bends should be avoided. The highly volatile nature of aviation fuels, and the rapid changes of temperature and pressure due to fast climbs, contribute to the number of difficulties encountered in ensuring that vapour locks cannot occur. It should be realised that these vapour locks can cause fuel starvation, and in the worst case absolute failure of the fuel supply.

Aviation fuels are composed of a mixture of hydrocarbons of variable proportions. These constituents have varying vapour tension, and as the proportion of these constituents is very difficult to control, the actual composition of aviation fuel is apt to vary a good deal. There is also a considerable amount of air dissolved by the fuel at ground level, in addition to such highly inflammable gases as butane and propane. These gases are held in solution by atmospheric pressure alone. It has been noted that within fuel tanks, the composition of the fuel is varied in propor-



Joint faces of a tank treated with special rubber solution.

tion to the amount of space occupied by the fuel in relation to the air space above the fuel. Should the pressure within the tank be atmospheric, as at sea-level, certain constituents will be given off in the form of vapour. In the event of the pressure being reduced, as at altitude, there will also be a reduction of the relative temperature at which both fuel vapours and dissolved gases are released. This principle causes a great deal of trouble in aircraft fuel systems. It often reveals itself when the pressure in a fuel line is below that of ground atmospheric pressure, as in suction lines from tanks to fuel pumps.

It has been found that in long horizontal pipes, during suction, vapour bubbles form, due to the reduced pressure allowing the more volatile gases and dissolved air to be released from the solution state and to separate from the heavier constituents of the fuel. During a series of experiments carried out at the Etablissement A.M., in France, it was noted that the vapour bubbles in horizontal suction pipes were of considerable volume. At pressures corresponding to about 18,000ft. altitude, it was found that approximately 30 per cent. of the cross-sectional area of the fuel column was composed of vapour bubbles.

To reduce the tendency for these vapour bubbles to form it is therefore necessary to cut down the length of suction lines to a minimum. An interesting method of overcoming the problem was the insertion of the fuel pump into the fuel tank itself, so that there was absolutely no suction line, and no suction head to overcome. The probability of vapour bubbles forming within the fuel pipes was thereby reduced to a minimum.

Another cause of vapour formation is heating caused by bringing the fuel lines into close proximity of exhaust pipes, cabin heating ducts, etc. Therefore adequate measures should be taken to ensure that all fuel supply pipes are kept as cool as possible.

In summation, it should be noted that all suction lines should be as short as possible, and all long horizontal pipes, inverted "U" bends, and varying sections should be avoided. Also all fuel supply pipes should be as cool as possible. If these conditions are rigidly adhered to, the risk of fuel supply failure due to vapour and air locks will be reduced to a minimum.

Cross-feeding of Fuel

The great advantages of cross-feeding apply both to civil aircraft and military aircraft. With a cross-feeding system it is possible, at the pilot's discretion and choice, to transfer fuel to a given engine from tanks not normally feeding that engine. It is also possible to transfer fuel from full tanks to empty tanks. Various systems have been designed, and nearly all consist of a hand emergency petrol pump, several change-over cocks, and a complicated piping arrangement. The advantages gained are many.

Consider a four-engined aircraft, for example. Normally it would have four fuel tanks, each serving a given engine. In the event of one engine cutting out over bad country, it would be necessary in a heavily loaded craft to open up the throttles of the remaining three engines, with a consequent increase in the consumption of fuel. During a flight involving the crossing of large stretches of seas, or bad country, this would be of serious moment. With a cross-feeding system, however, the fuel in the tank serving the dead engine can be transferred to the tanks of the three engines remaining in operation, thus giving an increase of range and safety.

A further use of this system will enable all motors to be kept in operation when a tank serving a given motor loses its contents. As all fuel pumps fitted to aero engines have a large reserve capacity, it is very easy to cut out the faulty tank and feed the appropriate engine with fuel circulated from the other tanks, via the fuel pump of the other engines.

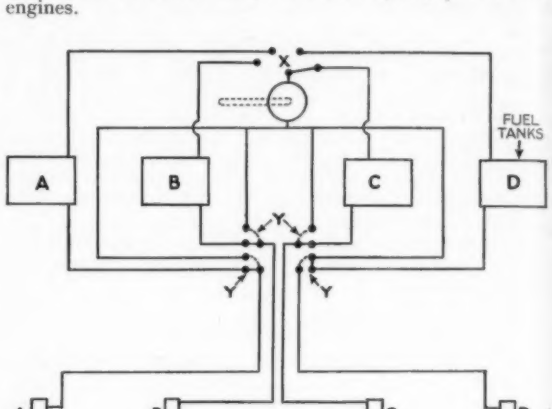


Diagram showing how the contents of Tank "D" are transferred to the other tanks. "X" is selector cock, hand pump to tanks. "Y" is selector cock, tanks to engine or to hand pump.

It is also possible, using Pesco fuel pumps, to keep an engine running when its own pump has ceased to function. This is done by passing either the excess fuel from another engine fuel pump through the damaged pump, or by using the hand-operated emergency pump.

The reader will realise the advantages of cross-feeding, and despite its complications it is probable that it will be used on all future aircraft of long range.

Safety Considerations

Whilst deciding the best disposition of tanks and fuel lines, consideration must be given to adequate fire protection. This can be ensured by the use of fire-walls, etc. It should also be noted that, in no circumstances should a system be designed which, in the event of the slightest leak in tanks or pipes, will allow petrol or petrol vapour to come into contact with hot exhaust pipes or exhaust gases. Aviation fuels vaporise at very low temperatures and will ignite when brought into contact with surfaces of a temperature of 600 deg. C. or over. As exhaust pipes and manifolds sometimes reach a temperature of 1,400 deg. C., adequate means must be taken to ensure that vapour or fuel *cannot* contact any part of the craft likely to ignite them.

As a further aid to safety, it is essential that all fuel lines subject to vibrations or strain should be composed of flexible piping, and a last important feature is that the whole system must be electrically bonded to a socket placed near the filler neck of the fuel tank. When filling is taking place, this socket is earthed, to eliminate the possibility of any discharge of static electricity, as the flash caused by the discharge can ignite the fuel vapour.

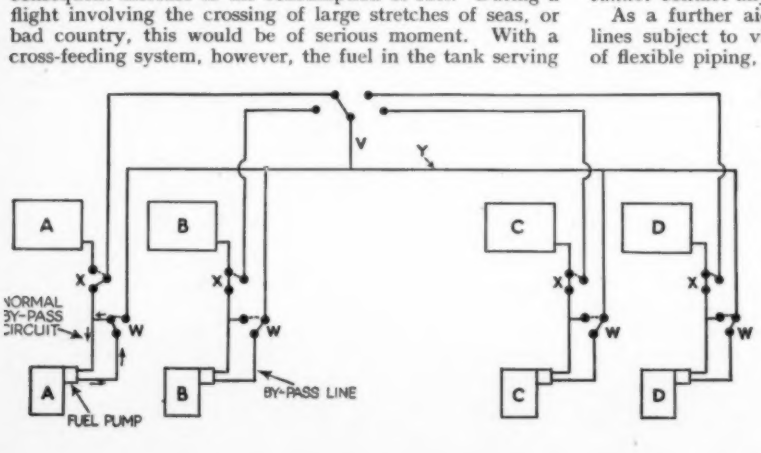
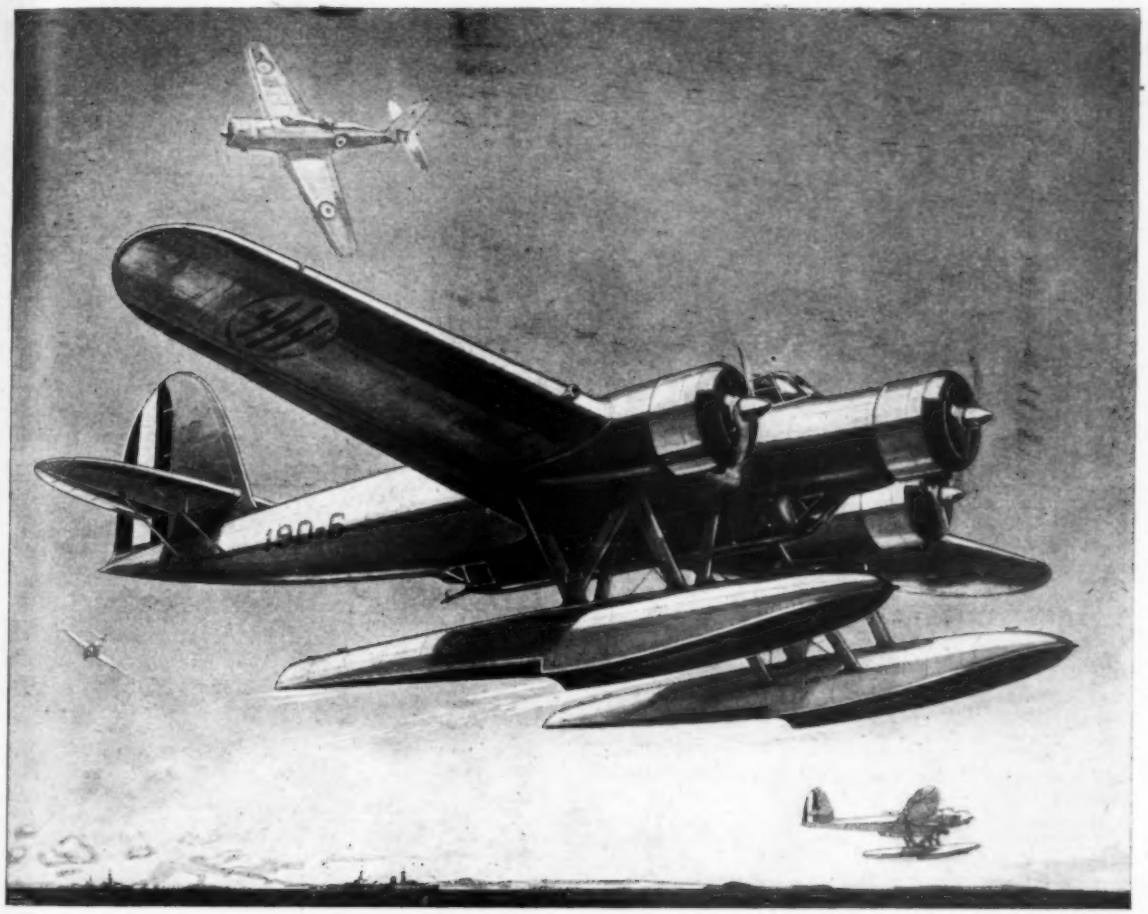


Diagram showing how fuel can be transferred from other tanks when tank "A" is holed. The same system would be used if engine pump "A" was damaged, and fuel would be sent from tank "A" to other tanks as in the diagram above.



A special *Flight* drawing showing the main characteristics of the Cant Z.506B floatplane. Our artist has visualised an attack on aircraft of this type by Blackburn Roc fleet fighters.

THE "CANT" SEAPLANES

A Three-Engined Floatplane and a Single-Engined Flying Boat

LARGEST of the Italian coastal-defence marine aircraft is the Cant Z.506B three-engined floatplane, which can be used for bombing, torpedo-dropping or reconnaissance. Supplementing this type is the Cant Z.501 single-engined flying boat. This machine is utilised for bombing and reconnaissance, but is not equipped for carrying torpedoes. Both aircraft are produced by the Cantieri Riuniti dell'Adriatico, of Monfalcone.

The Z.506B is a military development of the Z.506 transport machine as supplied to the Italian air line *Ala Littoria*. It was the prototype Z.506 which established sixteen world's records: eleven speed records with load, three distance records in a closed circuit and two height records with load. Taking advantage of more powerful engines, the Z.506B also broke a number of records, including the distance record for seaplanes, with a flight to Caravellas (4,362.6 miles).

Although the Z.506B is normally flown at an all-up weight of 26,895 lb., it can easily be overloaded, as was demonstrated by the height record with a load of 11,023 lb. For this attempt the machine took off in thirty seconds at a gross weight of 28,770 lb. Later it was taken off at a weight of 33,179 lb. in fifty-eight seconds, and established a record over 5,000 km. (3,100 miles) with 1,000 kg. (2,200 lb.) load.

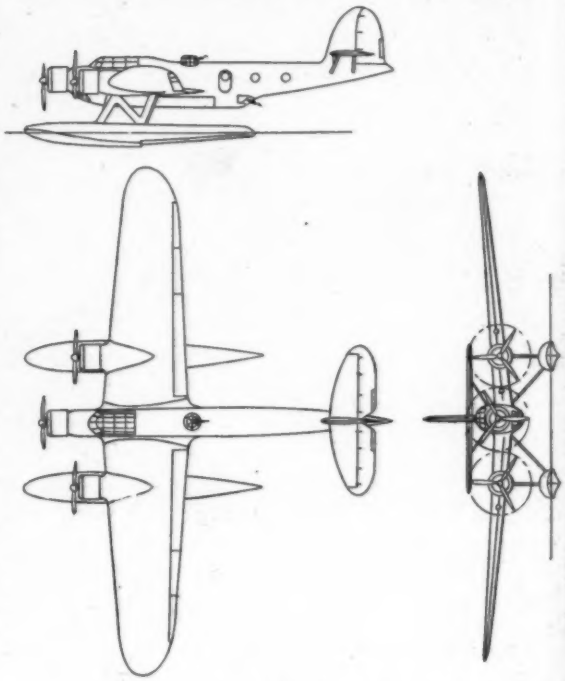
CANT Z.506B
Three Alfa-Romeo 126 RC 34 Engines

DIMENSIONS	
Span	86ft. 11in.
Length	63ft. 4in.
Height	22ft.
Wing area	915 sq. ft.
WEIGHTS AND LOADINGS	
Weight empty	18,078 lb.
Weight loaded	26,895 lb.
Wing loading	29.4 lb./sq. ft.
PERFORMANCE	
Top speed at sea level	195 m.p.h.
Top speed at 13,000ft.	229 m.p.h.
Climb to 13,000ft.	14 min.
Absolute ceiling	27,850ft.
Approximate range in still air	1,240 miles.

The Z.506B is arranged as a low-wing cantilever monoplane, though the underslung bomb compartment makes it, in effect, a mid-wing type. The fuselage is approximately of elliptical section, and is made of wood, the covering being of poplar ("tulip tree wood"). Describing it further, the manufacturers state: "The longitudinal system is constituted by a strong keel, a strong deck stringer and four side stringers. The cross bracing comprises, in addition to the three strength bulkheads to which the main spars are attached, also a system of reinforced panels and of simple panels." At the forward end of the monocoque structure is a bulkhead with fittings for the attachment of the engine bearers.

The wing tapers in chord and thickness, and has elliptical tips. Its main structure is constituted by three box spars with spruce flanges and plywood webs. Interconnecting the spars is a

THE "CANT" SEAPLANES (CONTINUED)



Above is a squadron of "Cant" Z.506Bs at an Italian coastal station. Some form of "sea camouflage" may have been adopted since this photograph was taken. On the right are general arrangement drawings of the Z.506B.

system of solid ribs which, together with the plywood covering, contributes to stiffness in torsion and at the same time forms watertight compartments. Behind the rear spar the ribs are of normal construction, and the covering is of fabric. The whole of the trailing edge is hinged, the inner sections acting as flaps and the outer ones as ailerons.

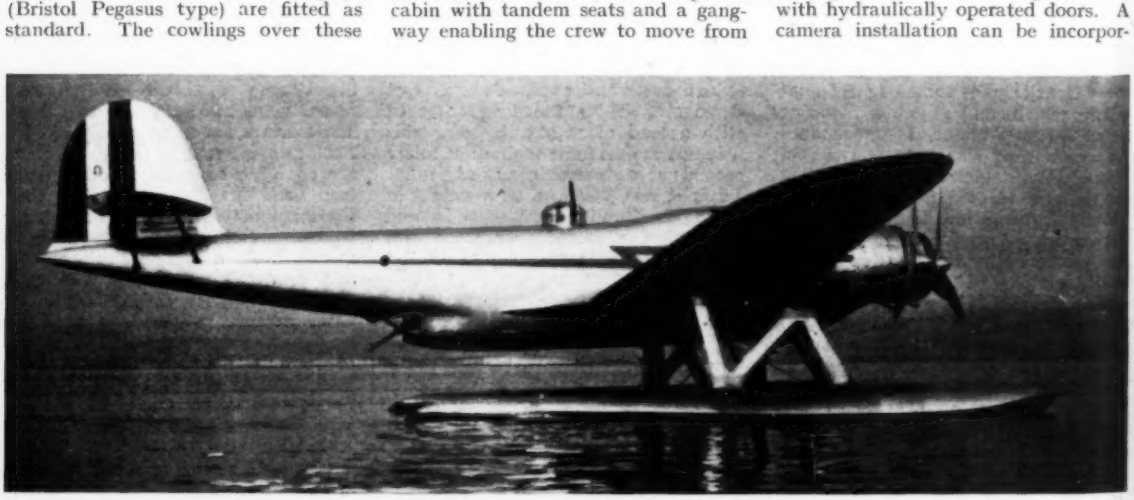
Differing from the fuselage construction, in that all surfaces are fabric-covered, the tail unit embodies a single fin and rudder and a tailplane attached some distance up the fin, where it is clear of spray during take-off.

As might be expected, the floats are of all-metal construction. They are of long, single-step design, and are attached to the outboard engine mountings by a system of struts which are wire-braced in their lateral planes. In accordance with standard Italian practice the total buoyancy of the floats is equal to twice the loaded weight of the aircraft.

Three Alfa-Romeo 126 RC 34 nine-cylinder radial air-cooled engines (Bristol Pegasus type) are fitted as standard. The cowlings over these units are similar to those normally employed in Bristol engines in this country, and embody the leading edge exhaust collector, though cooling gills are not fitted. Petrol is fed from tanks mounted in the inboard sections of the wing. The oil tanks are placed close to the engines they feed, the oil being cooled by radiators in the leading edge, *à la* Beaufort.

The first crew station in the fuselage is the bomb aimer's compartment located beneath the fuselage just behind the centre engine. This is liberally supplied with transparent panels. Above and behind it is the pilots' cabin with tandem seats and a gangway enabling the crew to move from the bomb aimer's position to the rear section of the fuselage. Next are the wireless operator's compartment, an upper machine gun, a power-driven gun turret, and a lower rear gunner's position. All machine guns are of the Breda SAFAT 12.7 mm. pattern, and are provided with 350 rounds of ammunition apiece. If required, a similar gun can be fixed on the forward part of the fuselage fairing for the use of the pilot.

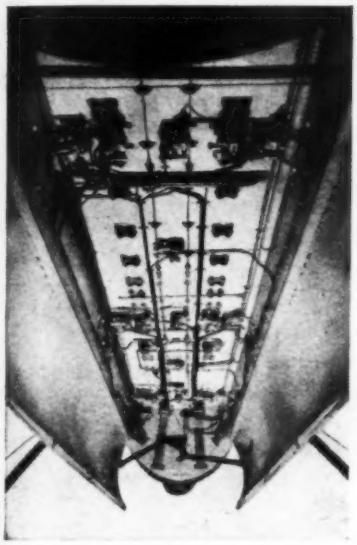
The bombs or torpedo (the latter can weigh between 1,760 and 1,875 lb.) are carried in the bottom of the fuselage, the cells being covered with hydraulically operated doors. A camera installation can be incorpor-



The location of the rear armament of 12.7 mm. Breda SAFAT guns is shown in the above view of a Z.506B on the water. The lower gun can be retracted completely into the hull when not in use.

THE "CANT" SEAPLANES (CONTINUED)

The Z.506B take-off picture on the right gives a fine impression of power and clean running. Pegasus type engines are used. Below is the torpedo or bomb compartment.



ated in the bomb-aimer's compartment.

Cant Z.501

On two occasions a production type Cant Z.501 single-engined flying boat broke the world's long-distance record for this class of aircraft. In October, 1934, a Z.501 flew from Monfalcone to Massaua (2,566.6 miles) and in July of the following year did the trip from Monfalcone to Berbera (3,063 miles).

From a distance the machine might be mistaken for a Dornier Do 18, due to the mounting of the wing above the hull and the location of the nacelle. On examination, however, it will be found that there are many points of difference.

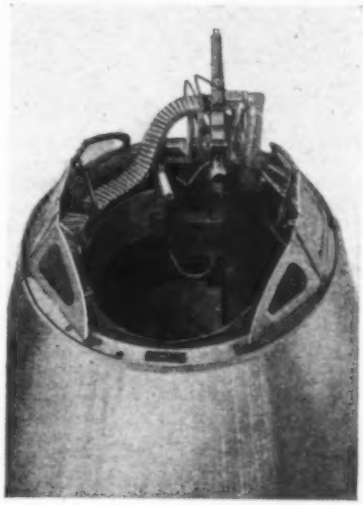
The central wooden hull is subdivided into three sections by two main bulkheads. Longerons of ash and spruce constitute the longitudinal system and the transverse frames are of similar materials. The two main bulkheads carry the attachment for the main wing bracing struts. The hull has two steps, the whole bottom and sides below the water line being in the form of a double skin with a layer of doped fabric between. The remainder of the hull has a skin of poplar covered with varnished fabric.

Wooden construction is also used for the wing, which has fabric covering. The other sections are approximately parallel in chord but have elliptical tips. They are braced to the hull by parallel struts. In each half-wing there are four petrol tanks with a total capacity of 608 gallons. Supplementary tankage for a further 110 gallons can be installed in the hull.

Interchangeability is a feature of the outboard floats. These are of a good streamline shape and are of similar construction to the hull.

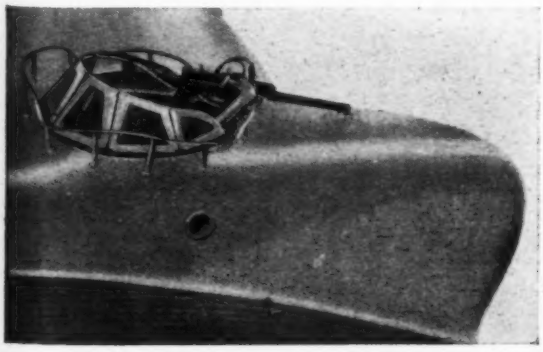
Fin, tailplane, rudder and elevator are all of wood with fabric covering. The lower part of the fin is built integral with the hull and the tailplane is braced by two struts on its under side and by streamlined wires above. Trimming tabs are fitted in the elevator and rudder.

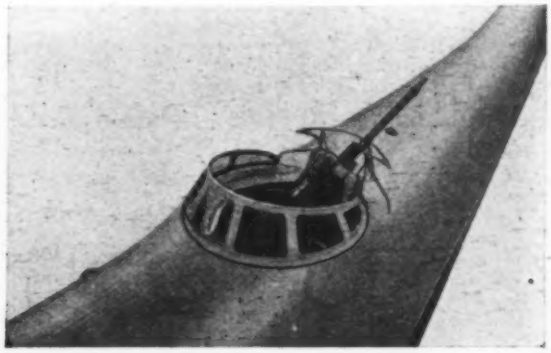
An Isotta Fraschini Asso XI R_2C 15 vee-twelve liquid-cooled engine is carried forward of the leading edge of the wing in a duralumin cradle supported by two steel struts. At ground level the engine gives 850 h.p., though 960 h.p. is available for take-off. Other characteristics are: Maximum output at 5,000ft., 900 h.p.; capacity, 32.14 litres; dry weight, 1,390 lb. The radiator is of the frontal type with an abundant surface, as the machine is used in hot climates. An Isotta Fraschini pump draws petrol from a collector tank in the nacelle.



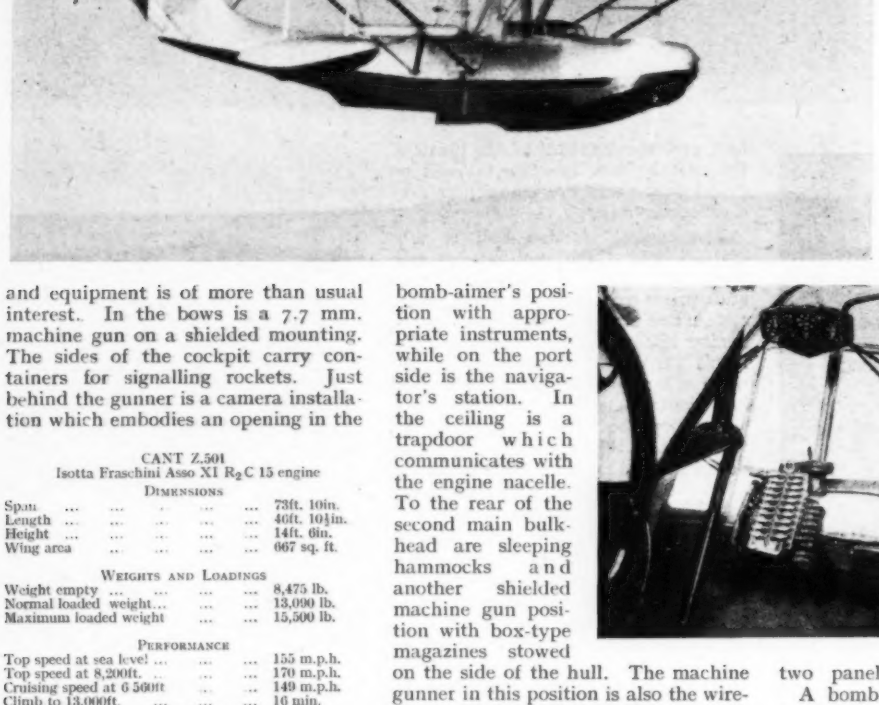
The bow gun installation on the Cant Z.501 flying boat. The screening and feeding arrangements are interesting.

The disposition of the armament





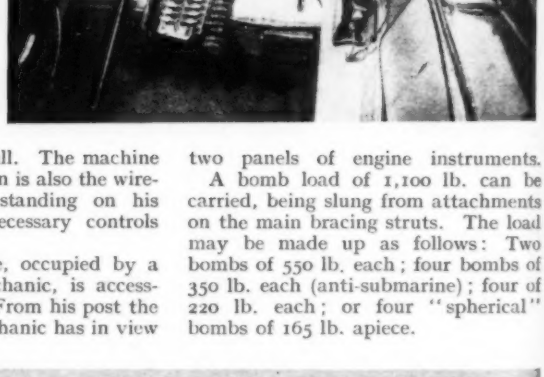
A Breda SAFAT gun is carried in the engine nacelle of the Cant Z.501 as shown on the left. It has an excellent field of fire. On the right is the amidships gun position, showing the guard rail.



THE "CANT" SEAPLANES (CONTINUED)

The head of the upper gunner can be seen protruding from the nacelle of the Cant Z.501 shown on the left.

Below is an interior view of the bomb-aimer's position on the Cant Z.506B.



and equipment is of more than usual interest. In the bows is a 7.7 mm. machine gun on a shielded mounting. The sides of the cockpit carry containers for signalling rockets. Just behind the gunner is a camera installation which embodies an opening in the bottom of the hull and behind this comes the pilots' cockpit with side-by-side dual control, central throttles, signal lights, etc. Aft of the first main bulkhead on the starboard side is the bomb-aimer's position with appropriate instruments, while on the port side is the navigator's station. In the ceiling is a trapdoor which communicates with the engine nacelle. To the rear of the second main bulkhead are sleeping hammocks and another shielded machine gun position with box-type magazines stowed on the side of the hull. The machine gunner in this position is also the wireless operator and, standing on his seat, he has the necessary controls within reach.

The engine nacelle, occupied by a machine gunner/mechanic, is accessible even in flight. From his post the machine gunner/mechanic has in view two panels of engine instruments.

A bomb load of 1,100 lb. can be carried, being slung from attachments on the main bracing struts. The load may be made up as follows: Two bombs of 550 lb. each; four bombs of 350 lb. each (anti-submarine); four of 220 lb. each; or four "spherical" bombs of 165 lb. apiece.

CANT Z.501
Isotta Fraschini Asso XI R_2C 15 engine

Dimensions	
Span	73ft. 10in.
Length	46ft. 10¼in.
Height	14ft. 6in.
Wing area	667 sq. ft.
Weights and Loadings	
Weight empty	8,475 lb.
Normal loaded weight	13,090 lb.
Maximum loaded weight	15,500 lb.
Performance	
Top speed at sea level	155 m.p.h.
Top speed at 8,200ft.	170 m.p.h.
Cruising speed at 6 560ft	149 m.p.h.
Climb to 13,000ft.	16 min.
Range at 136 m.p.h. at 3,250ft. in still air	1,490 miles

A Cant Z.501 touching down near the makers' seaplane station. The guns seen are of Lewis type but have been replaced by weapons of Breda manufacture. It will be seen that the machine resembles the Do 18.

ULSTER as an AIR BASE

Two Arguments in Favour of Northern Ireland: The Position of Eire

By J. M. SPAIGHT

THE Battle of France has been lost. The Battle of Britain is to come. It may be a battle on land; it will certainly be one in the air. The raids so far conducted against this country are only preliminary bouts. The great assault is still impending. It will be a massed attack. The Germans, we may be sure, are organising with all their diabolical thoroughness a network of air bases in Northern France, Belgium, Holland and Norway for the purpose of launching a vast onslaught upon this island.

We shall be hard put to it to stem the overflowing waves of assault. Our interceptors are splendid. Our anti-aircraft guns and searchlights are efficient in the extreme. Still, some raiders must come through, and if huge masses start, flying very high, then large numbers will evade our defence, simply because the sky is wide and high. There may be daylight raids. The bombers may be screened by fighters and then, though our Spitfires, Hurricanes, Defiants and Blenheim fighters (and soon, we may hope, the Curtiss, Brewster and Bell fighters from America) will take a very heavy toll of escort and convoy alike, there will be a residue of bombers to penetrate the defence.

The raiders will range far inland. Our centres of aircraft production may be bombed. Our aerodromes and aircraft storage depots may suffer. Substantial damage may be done both to machines in the making and to those already made. Output may be slowed-up through interruption of work in the factories. There is no part of this island which would not be within the range of Heinkel lll or Junkers 88 bombers, starting from the bases now available to them.

What then? I suggest that, to meet this danger, we need something more than the air defence in depth, consisting of the various zones of guns and interceptors and the balloon barrages, upon which we rely at present. We want a line behind those lines, and a line which the raiders are unlikely to reach.

Reserves for Counter-attack

In principle, the system of defence against ground attack adopted in the light of the experiences of 1914-18 rested upon the creation of a powerful force reserved for the counter-attack. The most formidable defences, it was recognised, might be breached if a sufficient mass of attack was hurled against them and thrust forward with sufficient determination. There might be at least a partial break-through. To overwhelm the invaders pouring through the breach was the purpose of the counter-offensive force maintained in readiness in the rear of the zone of concrete and steel.

We know that the German mechanised forces succeeded in smashing a way through the French position in the Sedan area, and that it was that break-through which led eventually to the loss, in turn, of the Battles of Flanders and of France and the ignoble capitulation of the Pétain Government. (What the *ultimate* result of France's defection may be cannot yet be foreseen; there are ugly possibilities at Gibraltar, in Egypt, and elsewhere, but I am concerned only with air defence at home.) At first sight it might be thought that the principle of defence referred to had been tried and found wanting in this crucial instance. Actually, it was not really tested at all. There was a failure to organise the system as those who conceived it had advocated. The defence in depth was woefully inadequate, and no sufficient counter-offensive force was available to flatten out the "bulge" which the German inroad formed.

The position is different in the air, but the principle is really the same. Here, as in ground defence, it is a question of having a disposable force to throw into the battle or behind it at need That force should be beyond the reach of the enemy's first assaults and should be ready for use when the waves of attack have begun to slacken, which they are bound to do before long. So placed and so held it can be decisive. In its absence, given raiding by the enemy on a really massive and widespread scale, the power of our Air Force to meet the attacks and to carry the counter-offensive into the enemy's territories might be seriously weakened; our ability both to defend ourselves and to strike back might be impaired to such an extent that the war in the air would be practically lost.

That could not happen if we held in reserve a great mass of aerial manœuvre outside the range of the German onslaught. Where should it be? I suggest—Ulster. There, twice separated by the sea from the nests of the German hornets, it would be safe from their unwelcome attentions. One or two might come buzzing so far afield but they would probably be "swotted" if they did. Of course, Ulster would not be a suitable starting point either for our fighters on their patrols or for our bombers in their raids, but that objection could easily be met by arranging for refuelling in this island. The great merit of the scheme is that it would give us a secure base for our operations in the air.

A Powerful Deterrent

It would cease to be a secure base if the Nazis could effect a landing in Eire and overrun that country; and this brings me to the second and hardly less important argument in favour of the proposal. It is that such a great force, concentrated in Northern Ireland, would make any German descent upon Eire a far more dangerous adventure than it would otherwise be. The suggestion has been put forward (in a leading newspaper) that we should maintain in Ulster a force of mechanised troops and tanks ready to be sent racing southwards if a German landing in Cork, Waterford or Wexford were to be threatened. A powerful air force would be an even better instrument for the same purpose. It could be on the scene of the invasion in an hour or less, and it should be able to deal faithfully both with whatever air elements the invaders could assemble so far from their base and with any ground forces which were landed. It could strike more swiftly and not less effectively than mechanised columns moving down through roads impeded by old women driving recalcitrant donkeys, and, perhaps, by I.R.A. obstructions, from the north.

The effect might thus be to stifle at the outset an attempt that, allowed to develop, might become a grave danger to this country. The other result, already referred to, would be to leave available a great and untouched reserve force of the air which could be launched with telling effect against the air invaders of Britain itself and against their bases on the Continent. It would be a heartening thought in times when our own air bases were being sorely beset that we had behind them that further base which lay safely beyond the Irish Sea and from which our strength in the air could renew itself without hindrance.

It would be, finally, a shorter "hop" to Ulster than to Britain, for the Hampdens which are being built in Canada and for any large bombers which are obtained in the United States and could be delivered by air. Aircraft sent as ship's cargo could be landed there, one imagines, as readily as in Great Britain, and this would relieve congestion at our west-coast ports. Altogether, there is a strong case to be made for establishing in Ulster a great inter-depot-reserve for our air establishments in this country. It is worth while to do so still, for this is likely to be a long war.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

THE AIRCRAFT INDUSTRY

Designing for Production

I HAVE read with interest the articles in *Flight* by Capt. MacMillan and "Realist." There are many points in Capt. MacMillan's article with which I agree, particularly when he states that we have too many types of aircraft to make quantity production easy, and that is the great necessity at this time. With so many types, the tooling costs are excessive to the country, and the multiplicity of different sizes of tubes and extruded sections make production of the essential raw materials very costly.

Generally it will be found that aircraft parts are designed from the designer's viewpoint only, whereas they should only be designed for ease of production, but, of course, in conjunction with the design side. In any case, the production and tool departments should have the final say, and parts should be modified to suit their requirements. In this connection, one very important part of a particular aircraft comes to the writer's mind; this part is so difficult and costly to produce that it is the bottleneck of the whole production line, and the designer appears to have had no thought in his mind as to how the part could be made.

Going farther into this matter it will be found that there are far too many different kinds of steel available to the aircraft designer, and these can be very considerably reduced to keep down production costs at the steel works. It will also be found that aircraft manufacturers have their own particular lists of standard parts which are required in their works for construction. This makes sub-contracting extremely complicated, because, instead of three or four main firms being able to place parts of similar design on an outside contractor, the contractor is faced with machining three or four different designs of parts to fulfil the same function in different aircraft.

"Realist" also states that the supply of parts and components from sub-contract firms comes from so many scattered points that there would be little delay in production in the event of many of these being put out of action. I suggest that "Realist" has no practical knowledge on this subject, and he would be well advised not to make rash statements.

In closing, the writer would like to make an appeal to any inspectors, Government or otherwise, to pass through parts which are serviceable and can be used at this critical period, even although they do not reach the high standard which we are accustomed to expect. The rejection of a part is so easy, but it takes a good sound engineering inspector who will be prepared to pass parts below standard, and accept full responsibility.

SUB-CONTRACTOR.

ASSISTING TAKE-OFF

The Question of Porpoising

IN your footnote to my article, "Assisting Take-off and Alighting," you query whether increased length on the waterline would suffice to avoid porpoising. I think that there are strong reasons for supposing that it would, though it is not the only means available for dealing with the problem.

I believe that porpoising is confined to stepped hulls where the buoyancy is unequally distributed about the working step. The necessities of take-off force this type of design upon the constructors of flying boats. A boat designed for unassisted take-off must have the major portion of its buoyancy right forward to counter the overturning moment due to the high thrust-line. The afterbody usually rises at an angle of 7-8 degrees aft of the main step so that the hull can be rocked back to the proper attitude for take-off. The afterbody is tapered off fine for aerodynamic reasons. When such a hull is planing it is balanced precariously on the main step subject only to the control of relatively small air forces acting upon the elevator. A wave striking the large forebody will pitch the hull through a large angle before the buoyancy of the afterbody suffices to overcome it. The air forces on the main plane exaggerate the tendency. Hence all the operating forces tend to instability.

If only the alighting condition has to be considered, the distribution of buoyancy may be much better. As high water-drag is now advantageous rather than otherwise, the waterline may run the whole length of the hull. Sharp Vee sections would cut into waves rather than ride them. The c.g. may be very much lower owing to lower placing of the engines and fuel tanks. All these factors serve to reduce the magnitude of pitching forces and to damp them when they are initiated.

A further possibility open to the designer of a hull for alighting only is to employ a hydrovane to control trim. As hydrodynamic forces are very large at high speeds the vane could be very small. A hydrovane placed aft of the c.g. near the tail might be arranged to enter the water first on alighting and to exert a thrust tending to hold the tail down. This would be a very simple device and might be made to control trim during the alighting run quite automatically, since any tendency of the hull to dive would increase the angle of the vane and consequently the restoring force.

In regard to your doubts about the possibility of dispensing with the v.p. airscrew, I would point out that if the aircraft is accelerated up to or above take-off speed by external power, airscrews of high pitch/diameter ratio can be used. These airscrews not only attain the highest efficiencies, but are efficient throughout a wide range of forward speed. Also, to an aircraft operating over water and capable of alighting at very high speeds, a high initial rate of climb is no longer the life-or-death matter that it is to the land machine.

I am disposed to agree with your prediction as to the cruising speeds of future flying boats. I believe that an aerodynamically efficient flying boat would displace the land-plane for commercial operation, because of its greater economy and safety. The land machine seems doomed to extinction by the appalling amount of ironmongery which it has to carry with it in order to effect a landing.

F. W. KING.

New Malden.

THE MYSTERY AEROFOIL

An American Invention

I HAVE before me as I write an article entitled "Mystery Airfoil"; it is the story of the Davis aerofoil and its inventor, David R. Davis.

All readers of *Flight* will readily recall the phenomenal Consolidated 31 flying-boat with its Davis wing and, more recently, the B-24 4-engined bomber of the same make. Until I read the story of the Davis foil I did not fully appreciate the fact that it was destined to go down in history as one of the epic inventions of our time with the most far-reaching effect on the design of aircraft.

Here, indeed, is an enthralling and inspiring story: "A curve, he perceived, was not a dead geometric figure. IT WAS A LIVING, MECHANICAL, OPERATING THING. On the basis of this, he could not but depart from what now seemed an archaic process of obtaining the most efficient curve for an airplane wing—the so-called 'cut and try' methods." Again, "A curve, he saw, was the product of mechanical action—rotation at infinite speed. 'A circle,' he said, 'is not an inert object. It is something going around—a radius arm (or lever arm) rotating about a centre.'

"Having stumbled on this hypothesis, he discovered that the most efficient mechanical action to produce lift would result from the proper relation between the rotational speed of the radius arm and the translational velocity of the point about which the radius arm rotates.

"Two factors must be borne in mind . . . one is rotation—MOVEMENT of the radius arm around the centre of a circle. The other is translation—movement of the centre itself.

"Mark a dot on a piece of paper, designating it as the centre of a circle. Place the point of a pencil on that dot, then lay the pencil down to form a radius, or lever arm. Now turn the pencil clockwise and, at the same time, move the point in a straight line to the left (thus indicating movement of the circle's centre by the latter motion). The curve formed by the top of the pencil as result of this simultaneous action is fundamentally part of a Davis airfoil profile—the product of two *steady movements*.

"Steadiness is important. 'If you rotate a flywheel steadily it takes less effort to keep it moving,' Davis explains. 'If done jerkily more H.P. will be required. The same is true of translation. The centre of the circle must move at a

(*Continued on page* 51.)

VISIBLE VORTICES?

White Sky Trails : A Possible Explanation

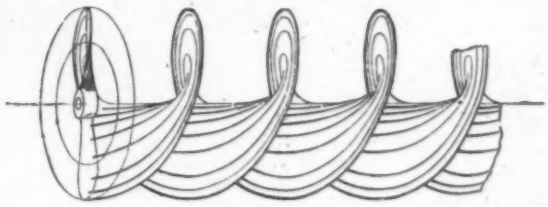
SOME readers may have observed lately what they at first thought to be sky-writing, and a member of the staff of *Flight* saw a particularly good example on Sunday afternoon, July 7, over London. The same sort of thing had been seen previously, but this was the best example to date and exhibited some features not observed on other occasions. For the benefit of those who have not seen the phenomenon it consists of a thin line of what looks like white cloud, or perhaps of very white smoke made by a sky-writing aeroplane.

On the first occasion that these were observed (in April), they were criss-crossed about the sky and some of them were quite steep. If done by an aeroplane, it was apparently on the glide. The lines lasted for a long time, at least an hour or more, and dissipated only very slowly. The weather was very fine, the time about 4 or 5 p.m., there was no wind on the ground and there appeared to be none at height among the cumulus clouds.

The weather of Sunday, July 7, bore a marked resemblance to that of the other occasion; numerous white cumulus clouds filled the sunny sky. But this time the trail was observed in the making. It was very white, exactly resembling the texture and colour of the clouds, very long, and apparently was on a slight climb. This last may, however, be open to some doubt as the trail was very high. It was so high that the aeroplane making it could not be seen, although the fact that the trail *was* being made was established beyond doubt—its steady increase of length testified to that. Nor could the sound of the engine be heard. This seems to point to a height of something like 20,000ft. or more.

One very noticeable feature was that the trail had a definite helical character, with the pitch of the helix of the same order as its diameter. Apparently the helix was composed of air which had been through the slipstream.

The origin of the phenomenon is worthy of some speculation. It may, perhaps, be due to the discharge of white smoke from a military aeroplane for some purpose connected with the war. In such a case we will, of course, not be told anything about it. But it may be another form of the visible vortex, cases of which have been numerous enough and well enough substantiated to be accepted without doubt. The same member of the staff who saw the trails has also seen the ring around the airscrew disc which is sometimes visible. Each time this was seen it was on a bright but fresh morning, the sort of morning on which the dew sparkles on the grass, and the time was between 7 and 8 a.m. in Australia; to be exact, at the Essendon Aerodrome, Melbourne. The machine in question was a Moth, and the ring was seen only during the time of opening up the throttle in the take-off run.



Sketch of a helical vortex sheet behind an airscrew, from Bairstow's "Applied Aerodynamics" by courtesy of Longmans. The shape of the trail seen bore a marked resemblance to this.

The same thing has been photographed and *Flight* published a view of a Handley Page Hampden on page 601 in the issue of June 15, 1939. On the same page is a letter stating that the correspondent had seen a wing tip vortex when the Martin Baker fighter was pulled out of the dive into the zoom. This was said to be a brilliant white streamer some 6 or 8 feet long. It was also stated that vortices from wingtips have been visible in high speed dives by American aircraft in the 1936 races and also at one R.A.F. display at Hendon.

The explanation which has been given before as a possible reason for visibility of these vortices is that there is condensation of moisture. Such condensation might perhaps be caused in regions of low pressure which may be those parts of the vortex where the velocity is highest. Perhaps there is significance in the fact that it is at the tip of the airscrew (where the blade velocity is greatest) that the visible ring occurs. A fog formed by reduction of pressure can be seen in tunnelling work under the earth when, in order to keep out water, compressed air is supplied to the working face. The men, to get out, have to go into a chamber where the pressure is reduced before they can go into atmospheric pressure. During this decompression, the whole chamber may be filled with fog.

In the case of the trail behind an aeroplane, the condensation theory might be correct as there is plenty of water vapour in the products of combustion in the exhaust gas. If the atmospheric conditions are right, the condensation would certainly cause a visible trail.

This explanation may not be the right one, but it does seem to fit the facts fairly well. It would be interesting to hear from readers who have any additional facts to add or any alternative explanations to give.

CORRESPONDENCE (Continued from page 50)

steady rate. The combined steady actions will trace the top curve of an airfoil, and a million of these (an abstract number) will form the wing's cover.'

"A wing surface is no more inert than a buzz-saw, Davis declares. It is a mechanical device whipping the tar out of the airstream, smashing all its resistance and converting it into work for the 'plane. That, stripped of elegant technical terms, is 'lift.' To illustrate this, Davis uses the golfer. The golf club rotates around the hand as a centre. Both hand and club are moving—translation and rotation. If the swing is not smooth the ball won't travel far. A weakling with a steady swing will send the ball farther than a muscular gent. with jerky style.

"An airfoil is the golf club in opposite action—seizing the ball as it would come to it in a reverse motion picture and killing its resistance. The more smoothly the wing does this with air the faster the 'plane will travel with least effort. A wing in flight, to Davis at least, is nothing more than millions of lever arms grabbing and taking the punch out of the air.

"Where is the mystery in an airfoil so readily explained by its creator? Ah, that is the formula which expresses the most perfect relationship between the rotational and translation speeds. With the seemingly endless possibilities involved no less than an Einstein, one would surmise, could arrive at this formula. But Davis calls it a natural conclusion reached once the old ideas of airfoil design are junked."

The article goes on to tell of the innumerable and possibly inevitable difficulties Davis encountered in trying to get people interested, how the N.A.C.A. were flabbergasted when they observed for themselves the amazing efficiency of the Davis foil when compared with the super-foils they had evolved.

In discussing foreign interest in the Davis wing, the following is relevant: "... negotiations with one particular country (reliably reported to be ENGLAND.—ED.), whose name he cannot disclose, because of the international situation, have reached such an advanced stage that before this is published the Davis section may be putting new wings on European aircraft."

Apparently, Davis is not enamoured by the Dictators, or anybody who has discarded the democratic ideal.

Whether or no we are already building 'planes with this new aerofoil, I thought that I would bring this article to the notice of *Flight* readers.

JOHN W. MORRISON.

London, N.W.3.

Royal Canadian Air Force Photograph.

GOVERNOR-GENERAL VISITS R.C.A.F. HEADQUARTERS. The Earl of Athlone at the office of the Chief of the Air Staff, Air Commodore Breadner, who is seen with him in the picture.

HERE and THERE

Gold Coast Spitfires

A SECOND instalment of £5,000 has now been remitted to the Treasury from the Gold Coast Spitfire Fund. The fund was inaugurated in June, and by the end of that month no less than £10,000 had been received.

The Atlantic Again

IT is announced that British Overseas Airways will again commence operations over the Atlantic to New York within 30 days with a once-weekly service carrying mail and official passengers. The two boats which will be used will be *Clyde* and *Clare*, the latter being renamed *Australia*, which was intended for the Tasman service.

Better Late Than Never

THE Secretary of State for Air has appointed Air Commodore A. P. M. Sanders to be Director of Ground Defence. It is understood that his main duties will be connected with the ground defence of aerodromes and other R.A.F. establishments. Mere outsiders might have imagined that the defence of R.A.F. establishments of every kind would have been one of the first considerations when war broke out.

Ankole Joins the Others

IN addition to the many gifts of money towards the purchase of aeroplanes already announced, the Governor of Uganda has sent a telegram to the Colonial Secretary to say that the ruler, chiefs and people of Ankole have requested him to draw from the Native Administration's surplus balance the

Shipments to Australia

ACCORDING to the Melbourne correspondent of *The Times*, Mr. Fairbairn, the Australian Air Minister, announced recently that the shipments from the United Kingdom of Avro Ansons and Fairey Battles, which were suspended some time ago, were to be resumed immediately. Thus the delay in Australia's participation in the Empire Training Scheme, which it was feared would ensue, looks like being avoided. The total number of men who have enlisted in the Air Force is 23,674, and of that number no fewer than 5,463 have enlisted as air crews.

Indispensable

THE war has made little difference to *Kelly's Directory of Merchants, Manufacturers and Shippers of the World*, the 1940 edition of which has just been published by Kelly's Directories, Ltd., at 64s. As in previous years, the directory is in two volumes, of which Vol I deals with foreign countries, while Vol. II is devoted to Great Britain and the British Empire. To facilitate reference all names in both volumes are arranged both alphabetically and by classified trades. The only two countries omitted from Vol. I of 1940 are Germany and Poland, so that the directory is still as useful as ever.

A Popular Appointment

LORD BEAVERBROOK, Minister for Aircraft Production, has appointed Mr. R. H. Coverley his advisor on airscrew and aero engine production. Mr. Coverley, Controller of Rotol Airscrews, Ltd., was with Rolls-Royce, Ltd., for more than 30 years. There he was closely associated with the design, development and manufacture of Rolls-Royce aero engines and car engines, and with the Schneider Trophy and "Miss England" special racing engines. After acting in an advisory capacity to Rotol Airscrews, Ltd., for about a year, he was appointed controller of the company, which was, it will be recollected, formed in 1937 by the Rolls-Royce and Bristol companies, the word "Rotol" being composed of one syllable from each name. His appointment was occasioned by the increased demand for the airscrews, and the widening of the research and development activities of the company. To Lord Beaverbrook Mr. Coverley's long and wide experience will be of inestimable value.

Mr. R. H. Coverley, Controller of Rotol Airscrews, Ltd., has been appointed advisor on airscrew and aero engine production to the Ministry of Aircraft Production.

sum of £1,000 to be used towards the purchase of an aeroplane which would represent their country.

Obeying the Call

AFTER several years of civil life, Mr. Kenneth Shenstone, managing director of Henry Rossell and Co., Ltd., of Sheffield, has returned to the service as a pilot in the R.A.F. V.R. Mr. Shenstone served for three years in the Cambridge University Air Squadron and was seven years in the R.A.F.O.

Back to the Melting Pot

SOME months ago the Handley Page H.P.42 *Heracles* of Imperial Airways turned itself over on an aerodrome while workers were busy on board. No one was hurt except the aeroplane, so that even after more than 1½ million miles the machine lived up to its reputation until the last. The remnants of the wreck have now been handed over to the Ministry of Aircraft, following Lord Beaverbrook's appeal for scrap.

Orville Wright Now Licensed!

CONGRESS has authorised the issue to Orville Wright of honorary aircraft pilot's licence No. 1 in recognition of his outstanding service rendered to the science of aeronautics.

The bill will become a law when it is given the signature of President Roosevelt. It was introduced by U.S. Senator Claude Pepper last year, at the suggestion of Dr. Ralph N. Greene, director of Eastern Air Lines' aero-medical department in Miami. Dr. Greene is himself a pioneer pilot.

Swiss and Vatican Mails

THE Postmaster General announces that letters and other postal packets, except parcels, insured letters and insured boxes, may again be posted for transmission to Switzerland and the Vatican City State; but the mails are liable to censorship by the enemy and senders should accordingly exercise the utmost discretion as to what they send or write. Air mail correspondence should be prepaid at the European rate of 5d. for the first ounce and 3d. for each additional ounce (postcards 2½d.), and will be forwarded from this country by air for onward transmission as may be necessary by surface transport. Mails for Finland also are liable to enemy interception.

East India Flight Fund

ON May 22 the committee of the East India Fund for British war services forwarded to the Air Ministry from Calcutta a cheque for £30,000, with an intimation that they were desirous of contributing as much as possible towards the cost of providing a flight of fighter aircraft which they hoped might be given a special title indicating its association with the East India Fund. The initial equipment of such a flight comprises eight machines and the cost amounts to some £88,000.

This generous gift was gratefully acknowledged by the Air Council, and the committee were informed that arrangements would be made for the flight of Spitfire aircraft which they were hoping to provide to be named The East India Fund Flight, and that this designation would be inscribed on the aircraft of the flight.

On June 16 the committee forwarded a further gift of £10,000; and they have now contributed another £15,000, making £55,000 in all, towards the cost of the initial equipment of aircraft for the East India Fund Flight.

The Air Ministry are greatly encouraged by this evidence of the warm interest which the citizens of Calcutta and other parts of Eastern India, both British and Indian, take in the activities and achievements of the Royal Air Force, and they have sent most grateful acknowledgments.

SOMETHING NEW? The Vickers test pilots studying plans of further geodesy. Left to right: Flt. Lt. John Summers, Maurice Hare and Maurice Summers. Both the Summers brothers are members of the Caterpillar Club.

Record Savings

DURING June the number of National Savings Certificates issued to Dunlop employees was almost as high as the complete total for the preceding five months: 8,376 as against 8,432, or a total of 16,808 for the six months.

C.A.A. Changes

CHANGES which have occurred subsequent to the transfer of the Civil Aeronautics Authority to the control of the Department of Commerce, include the resignation of the administrator, Clinton Hester, to enter private law practice in Washington. A graduate in arts and law of two universities, Hester has served in different government departments for 22 years. He retires at the age of 45.

His successor will be Col. Donald M. Connolly, of the U.S. Corps of Engineers, a man previously unknown in aviation.

Another change is the appointment of Jerome Lederer as head of the Safety Bureau of the Civil Aeronautics Board as the Authority is now called. Thomas O. Hardin vacates the corresponding office which was abolished by the reorganisation. Lederer is well known as chief engineer for Aero Insurance Underwriters, which position he has held since 1929. He is a graduate in engineering of New York University, and after a year as assistant in the department of aeronautical engineering, received an M.E. degree in 1925.

The former secretary, Paul Frizzell, has also resigned and will be succeeded by Thomas G. Early as acting secretary at a considerably lower salary.

Tasman Fare Reduction

A REDUCTION has been made by Tasman Empire Airways in the fare across the Tasman Sea from Sydney to Auckland. Formerly £A30 single, it is now £A25.

Hong Kong to Bangkok

THIS section of the British Overseas Airways route was stopped at the time when all overseas flying stopped because of the Italian declaration of war. Operation of the section has now been resumed twice weekly. Bangkok is the junction with the main Empire route to Australia.

A Good Example

AT the Second Annual Summer Meeting of the American Institute of the Aeronautical Sciences at Pasadena, California, Major Lester Gardner announced that an endowment of 50,000 dollars has been provided by Mr. Paul Kollsman for the founding of an aeronautical lending library. Major Gardner said that the Institute would establish a library from which books could be borrowed by aeronautical engineers, pilots, Army and Navy officers, and others interested. There would be available at once 2,000 titles, as well as more than 100,000 books on general engineering. In addition the Institute would provide a reference library of more than 10,000 aeronautical books.

The idea might be taken up in this country. During the war it is difficult for aeronautical engineers to travel to London in order to consult books in the library of the Royal Aeronautical Society.

SERVICE AVIATION

Royal Air Force Official Announcements

Pigeon-keepers

ALL immediate vacancies for pigeon-keepers in the R.A.F. have now been filled. Should more vacancies occur at a later date applications will be invited through the Press.

Air Ministry Appointments

THE Right Honourable Sir Archibald Sinclair, Secretary of State for Air, has appointed Mr. R. H. Melville to be his Principal Private Secretary in succession to Mr. F. H. Sandford, who has been promoted.

Air Chief Marshal Sir Cyril L. N. Newall, Chief of the Air Staff, has appointed Mr. R. S. Crawford to be his Private Secretary in succession to Mr. Melville

Air Marshal E. L. Gossage, Air Member for Personnel, has appointed Mr. W. A. Campbell to be his Private Secretary in succession to Mr. Crawford.

Auxiliary Air Force Alliance

HIS MAJESTY THE KING has been graciously pleased to approve of No. 110 (City of Toronto) Squadron, Royal Canadian Air Force, being allied to No. 603 (City of Edinburgh) Squadron, Auxiliary Air Force.

This is the third alliance of a unit of a Dominion Air Force to a unit of the Royal Air Force. The first, announced on August 15, 1938, was that of No. 21 (City of Melbourne) Squadron, Royal Australian Air Force, and No. 600 (City of London) (Fighter) Squadron, Auxiliary Air Force; the second, announced on January 19, 1939, was that of No. 22 (City of Sydney) Squadron, Royal Australian Air Force, and No. 602 (City of Glasgow) Squadron, Auxiliary Air Force.

Radio Mechanics Wanted

SKILLED radio mechanics in the partially evacuated towns and other places who are finding it difficult to make a living under new circumstances should join the Air Force. There is a big demand for their services.

Partly skilled amateurs are not wanted for these posts. Applicants should have a sound and thorough knowledge of both the theory and practice of wireless sets. They will not be trained, since the type required is the man who does not need any training. They will be asked, however, to pass a trade test. The right sort of men can be accepted up to the age of 50. They must be able to repair sets and understand what they are doing.

Pay is at the minimum of 3s. 9d. a day, with possibilities of rising to 5s. 6d. a day, with all found. Applications should be made in the first instance to a Combined Recruiting Centre, the address of which can be obtained from any Employment Exchange.

Women Radio Operators

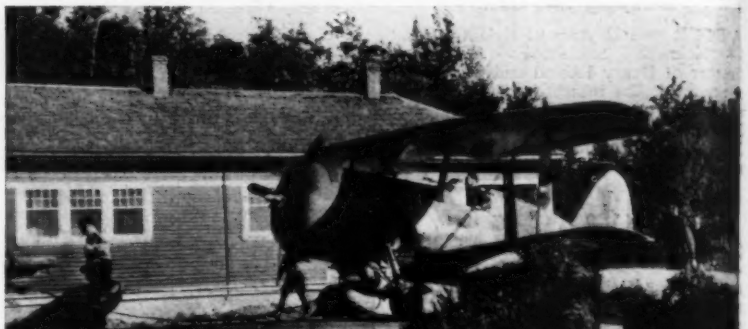
WOMEN of education and intelligence from 18 to 35 are wanted for special duties and as radio operators. Good eyesight is essential. The main qualification sought is that applicants should be able to work under pressure and not get "rattled." The pay is 1s. 4d. a day while under training and 2s. 2d. a day when trained.

Women are also urgently wanted in the W.A.A.F. for slip-reading. They must be typists, and they go through a course enabling them to read morse off a tape machine and type it in clear. Pay is 1s. 4d. a day during training and 2s. 4d. a day when they have satisfactorily completed their course. Age limits 18-43. Other typists are required as teleprinter operators and for various clerical duties. Pay is 2s. 2d. a day when trained; age from 18-43.

Applications for any of these posts should be made, if possible, to one of the W.A.A.F. Area Headquarters, the address of which may be obtained from any post office or Employment Exchange, or to a Combined Recruiting Centre.

Police and Batmen

SERVICE police are required for duty with the Air Force. Incidentally, this gives a chance to the not-so-young man. Recruits will be accepted from 21 to 45. They must be strong and physically fit, and not less than 5ft. 8in. in height. Pay is at the rate of 2s. a day, with 6d. a day extra when actually engaged on police duties.



ON THE WAY OVER: Curtiss SBC4 dive bombers being towed across the U.S.A.-Canadian border at Houlton.

There are opportunities of promotion for the right men, with higher pay and higher duty pay. A period of training will be given to accepted recruits.

Men are also required who have experience in domestic service or similar occupations and are not quite physically fit. They now have the opportunity of joining the Air Force as batmen if they are between 18 and 38 years of age. The pay is 2s. a day, with the usual chances of promotion. Men in medical grade 1 will not be accepted for these posts. The duties are varied and consist of looking after officers' quarters, waiting at mess, etc. Waiters who fulfil the prescribed conditions will be welcomed. Applications for either category should first be made at a Combined Recruiting Centre, the address of which may be obtained from any Employment Exchange.

Awards

HIS MAJESTY THE KING has been graciously pleased to approve the following appointments and awards to members of the Royal Air Force in recognition of distinguished services rendered in recent operations:—

ADDITIONAL MEMBERS OF THE MILITARY DIVISION OF THE SECOND CLASS, OR KNIGHTS COMMANDERS, OF THE MOST HONOURABLE ORDER OF THE BATH.

BARRATT, AIR MARSHAL ARTHUR SHERIDAN, C.B., C.M.G., M.C.
PORTAL, ACTING AIR MARSHAL CHARLES FREDERICK ALGERNON, C.B., D.S.O., M.C.

ADDITIONAL MEMBERS OF THE MILITARY DIVISION OF THE THIRD CLASS, OR COMPANIONS, OF THE MOST HONOURABLE ORDER OF THE BATH.

BLOUNT, AIR VICE-MARSHAL CHARLES HUBERT BOULBY, O.B.E., M.C.
EVILL, AIR VICE-MARSHAL DOUGLAS CLAUDE STRATHERN, D.S.C., A.F.C.
HARRIS, AIR VICE-MARSHAL ARTHUR TRAVERS, O.B.E., A.F.C.
LEIGH-MALLORY, AIR VICE-MARSHAL TRAFFORD LEIGH, D.S.O.
MARIX, AIR COMMODORE REGINALD LENNOX GEORGE, D.S.O.

ADDITIONAL KNIGHT COMMANDER OF THE MILITARY DIVISION OF THE MOST EXCELLENT ORDER OF THE BRITISH EMPIRE.

PLAYFAIR, AIR VICE-MARSHAL PATRICK HENRY LYON, C.B., C.V.O., M.C.

ADDITIONAL COMMANDERS OF THE MILITARY DIVISION OF THE MOST EXCELLENT ORDER OF THE BRITISH EMPIRE.

GLYNN, AIR COMMODORE ARTHUR SAMUEL.
HARDS, AIR COMMODORE (NOW ACTING AIR VICE-MARSHAL) FREDERICK GEORGE DARBY, D.S.C., D.F.C.
GODDARD, GROUP CAPTAIN ROBERT VICTOR.
THORNE, GROUP CAPTAIN WALTER.

ADDITIONAL OFFICERS OF THE MILITARY DIVISION OF THE MOST EXCELLENT ORDER OF THE BRITISH EMPIRE.

BATTLE, WING COMMANDER HENRY FREDERICK VULLAMY, D.F.C.
CARTER, WING COMMANDER RONALD HARTLEY, D.F.C.
DAVIS, WING COMMANDER EDWARD SIMEON COLBECK, A.F.C.
GROOM, WING COMMANDER (now ACTING GROUP CAPTAIN) VICTOR EMANUEL, D.F.C.
HAINES, WING COMMANDER HAROLD ALFRED, D.F.C.
HARDMAN, WING COMMANDER JAMES DONALD INNES, D.F.C.
HARRISON, WING COMMANDER GEORGE HENRY, D.F.C.
HART, WING COMMANDER RAYMUND GEORGE, M.C.
LANGFORD-SAINSBURY, WING COMMANDER (now GROUP CAPTAIN) THOMAS AUDLEY, D.F.C., A.F.C.
REVINGTON, WING COMMANDER ARTHUR PETRICK.
SUGDEN, WING COMMANDER DOUGLAS ARTHUR WILLIAM.
TRAILL, WING COMMANDER THOMAS CATHCART, M.C., D.F.C.
WILSON, WING COMMANDER (now GROUP CAPTAIN) GEORGE EDWARD.
SAYE, WING COMMANDER GEOFFREY IVON LAWRENCE, A.F.C.
CANNING, SQUADRON LEADER (now ACTING WING COMMANDER) PHILIP FRANCIS.
FINLAY, SQUADRON LEADER DENIS.
PEARCE, SQUADRON LEADER ROY.
TUTTLE, SQUADRON LEADER (now WING COMMANDER) GEOFFREY WILLIAM, D.F.C.
WESTON, SQUADRON LEADER GERALD PATRICK LINTON.
WICKS, SQUADRON LEADER FREDERICK FRANCIS, D.F.C.
SMITH, LIEUTENANT-COLONEL KENNETH PEARCE, The Royal Berkshire Regiment.

ADDITIONAL MEMBERS OF THE MILITARY DIVISION OF THE MOST EXCELLENT ORDER OF THE BRITISH EMPIRE.

CADDY, FLIGHT LIEUTENANT JOHN WESLEY.
DEASE, FLIGHT LIEUTENANT ERNEST JOSEPH, R.A.F. Volunteer Reserve.
KIRBY, ACTING FLIGHT LIEUTENANT FRANCIS CHARLES HOWARD.
DRAKE, FLYING OFFICER GEORGE STEPHEN.
EDWARDS, FLYING OFFICER DAVID.
FANNING, FLYING OFFICER JOHN.
HAMPSHIRE, FLYING OFFICER WILLIAM HUBERT GEORGE.
SCULLARD, FLYING OFFICER LEONARD.
CLAYDON, WARRANT OFFICER GEORGE FREDERICK.
GUEST, WARRANT OFFICER CHARLES VICTOR.
HAZEL, WARRANT OFFICER FREDERICK HUGH ROSS.
HENDLEY, WARRANT OFFICER WILLIAM JOHN.
KNOWLES, WARRANT OFFICER ALBERT BENJAMIN.
MARSHALL, WARRANT OFFICER WILLIAM JOHN.
NEWTON, WARRANT OFFICER STEPHEN ROBIN.
OLIVER, WARRANT OFFICER EDWIN SYDNEY.
RAY, WARRANT OFFICER WILLIAM CHARLES.
SEARLE, WARRANT OFFICER HORACE JOHN.

THE MEDAL OF THE MILITARY DIVISION OF THE MOST EXCELLENT ORDER OF THE BRITISH EMPIRE, FOR MERITORIOUS SERVICE.

CHRISTMAS, FLIGHT SERGEANT HERBERT GEORGE.
CLAMPITT, FLIGHT SERGEANT CYRIL HAVELOCK JOHN.
GIBSON, FLIGHT SERGEANT WILLIAM NOEL.
JOHNSON, FLIGHT SERGEANT EDWARD.
NUNN, FLIGHT SERGEANT PERCY WILLIAM.
ROSS, FLIGHT SERGEANT JOSEPH RESTALL.
STONEHAM, CORPORAL (now SERGEANT) JOHN BROWN.

APPOINTED A COMPANION OF THE DISTINGUISHED SERVICE ORDER.

WATTS, ACT. WING COMMANDER JOSEPH JOHN (since reported killed in action).

BAR TO THE DISTINGUISHED FLYING CROSS.

ORTON, FLYING OFFICER NEWELL, D.F.C.

DISTINGUISHED FLYING CROSS.

PEARCE, WING COMMANDER FREDERICK LAURENCE, D.S.O.

Towards the end of June, 1940, Wing Commander Pearce led a formation of aircraft in an

attack on a new enemy aerodrome. As a result of his careful planning, initiative and leadership, the raid was a complete success and very severe damage was done. Previously, this officer led a formation of aircraft in an attack on enemy warships in Trondheim and, in the face of intense opposition from anti-aircraft fire and enemy fighters, scored three direct hits on two enemy cruisers.

PITFIELD, FLIGHT LIEUTENANT ALAN LEONARD (since reported missing).
HANKS, ACTING FLIGHT LIEUTENANT PETER PROSSER.
LOVETT, ACTING FLIGHT LIEUTENANT REGINALD ERIC.
MACLACHLAN, FLYING OFFICER JAMES ARCHIBALD FINDLAY.
SNELL, FLYING OFFICER FRED WACE.
VERNON, FLYING OFFICER JAMES EDWARD (since reported missing).
MOULD, PILOT OFFICER PETER WILLIAM OLBER

One of the officers shot down four enemy aircraft in the first five days of the Germans' big attack. Another took part in ten combats against enemy aircraft in as many days. On one occasion he led five Hurricanes against a bomber escort of 25 Messerschmitt 110s, six of which were destroyed. This pilot had to land by parachute. Compelled to land in enemy territory, one officer assisted his wounded crew, destroyed his aircraft, and returned to his unit. An officer who was the first to shoot down an enemy aircraft in France has since shot down six others. A sergeant pilot has shot down eleven enemy aircraft, and another has accounted for five.

WING COMMANDER CHARLES HENRY APPLETON.
ACT. WING COMMANDER JOHN CHARLES MACDONALD.
ACT. WING COMMANDER JOHN JONAS ARTHUR SUTTON.
SQUADRON LEADER TERENCE HOWARD CARR.
SQUADRON LEADER GEORGE ARCHIBALD MARSHAL PRYDE (deceased).
SQUADRON LEADER JOHN SYDENHAM SABINE.
ACT. SQUADRON LEADER PHILIP ROBERT BEARE.
ACT. SQUADRON LEADER ROBERT DAVID COLQUHOUN GIBSON.
ACT. SQUADRON LEADER THEODORE MOSELEY HUNT.
ACT. SQUADRON LEADER LESLIE SCOTT LAWRENCE (since reported missing).
ACT. SQUADRON LEADER PETER FITZGERALD WEBSTER.
ACT. FLIGHT LIEUTENANT JAMES FREDERICK POWELL BROUGH.
ACT. FLIGHT LIEUTENANT STEWART FARQUHARSON COUTTS-WOOD.
ACT. FLIGHT LIEUTENANT RICHARD DENIS BARRY MACFADDEN.
ACT. FLIGHT LIEUTENANT JAMES ANDERSON PITCAIRN-HILL.
ACT. FLIGHT LIEUTENANT LEONARD HENRY TRENT.
FLYING OFFICER DOUGLAS SINCLAIR FORSYTH.
FLYING OFFICER GUY PENROSE GIBSON.
FLYING OFFICER DOUGLAS JAMES HOW.
FLYING OFFICER JAMES HARDY MARKS.
FLYING OFFICER RONALD COOPER ROTHERAM.
PILOT OFFICER KENNET HENRY PENRITH BEAUCHAMP.
PILOT OFFICER RICHARD CUMMINS HAINE.
PILOT OFFICER KENNETH ILLINGWORTH.
PILOT OFFICER RAYMOND THOMAS KEAN.
PILOT OFFICER MARCUS KRAMER.

The awards are for gallantry and devotion to duty during air operations.

One of the officers decorated succeeded in making a detailed reconnaissance of his objective from 500 feet. This enabled him, subsequently, to bomb the most vital part of the target accurately and with devastating results. Another officer was the leader of the first leaflet raid over the interior of Germany last September. He has conducted eleven convoy escorts and four bombing raids, setting a splendid example of courage and determination.

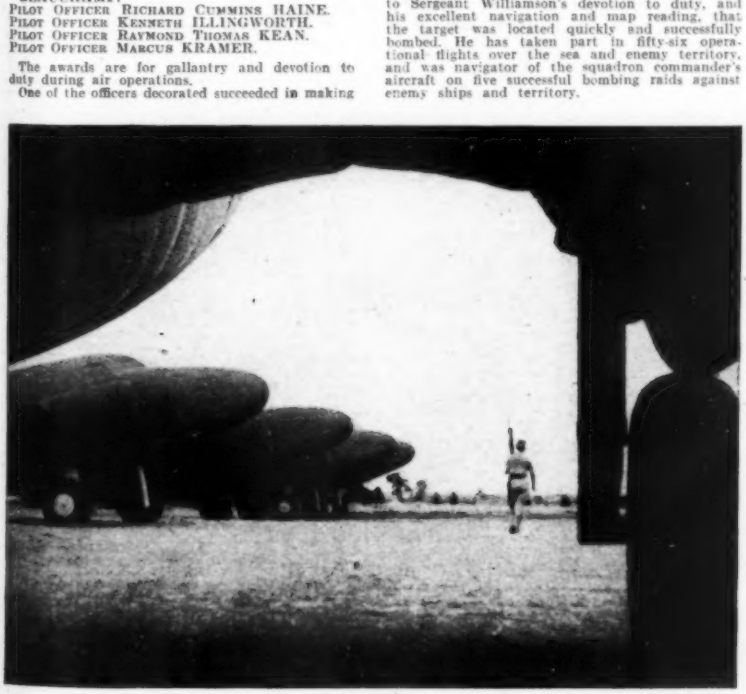
A Squadron Leader successfully attacked an enemy tank formation from a low level. His aircraft was disabled, made a forced landing and then caught fire. This officer escaped with his crew and made his way back to England. Another officer succeeded in dropping 500lb. delayed action bombs into a railway tunnel near Aachen from a very low altitude.

One of the young pilot officers attacked the bridges at Maastricht on May 12 in the face of heavy anti-aircraft and fighter opposition. While over the target his aircraft was hit by anti-aircraft fire, which wounded him, shattered the windscreen and put the port engine out of action. Two enemy fighters attacked. After a 15-minute engagement this pilot officer, by skilful handling of his aircraft, threw off his attackers. His starboard engine failed and he made a forced landing, returned to England, and has since carried out other successful operations. A sergeant is decorated for locating and bombing at Gembloux a railway siding and trucks with twelve 250lb. bombs from a height of 600 feet. A violent explosion resulted and it was evident that an ammunition train had been destroyed.

DISTINGUISHED FLYING MEDAL.

SOPER, FLIGHT SERGEANT FRANCIS JOSEPH (562898).
CRICH, SERGEANT WILLIAM RALPH (564578).
PILKINGTON, SERGEANT LIONEL SANDERSON (741935).
WHITE, SERGEANT RAYMOND ARTHUR CECIL DE COURCY (580094).
SERGEANT NORMAN RHYS ANSTEY.
SERGEANT PHILIP EDMUND BARNS.
SERGEANT RALPH BROWN.
SERGEANT GEORGE ALEXANDER CRAIG.
SERGEANT ERNEST ALFRED DEVERILL.
SERGEANT WILLIAM FLETCHER.
SERGEANT RAYMOND ALLEN MAWSON STONE.
SERGEANT GEORGE ALEXANDER WATT.
SERGEANT WILLIAM WIGHT.
SERGEANT BERTIE CHARLES WOOLDRIDGE.
ACT. SERGEANT GEORGE EDWARD APPLETON.
CORPORAL PHILIP WERRAN CURNOW.
CORPORAL RICHARD CUTHBERT DICKINSON.
CORPORAL KENNETH HENRY HARRIS (since reported missing).
CORPORAL HAROLD PERRY.
CORPORAL DARREL STABLES.
LEADING AIRCRAFTMAN ROBERT EDMUND HUNTER.
LEADING AIRCRAFTMAN GERALD DOUGLAS PRYOR QUINN.
LEADING AIRCRAFTMAN HAROLD RICHARDSON.
LEADING AIRCRAFTMAN GEORGE WILLIAM WHITEHEAD.
LEADING AIRCRAFTMAN GEORGE WHITTAKER.
SERGEANT FRANK WILLIAMSON.

Sgt. Williamson was navigator and bomb-aimer in the leading aircraft of a formation of nine, which made a successful attack on an enemy aerodrome one night in June. It was primarily due to Sergeant Williamson's devotion to duty, and his excellent navigation and map reading, that the target was located quickly and successfully bombed. He has taken part in fifty-six operational flights over the sea and enemy territory, and was navigator of the squadron commander's aircraft on five successful bombing raids against enemy ships and territory.



FOR AUSTRALIA'S COASTLINE: Lockheed Hudson aircraft ready for assembly at the Royal Air Force Depot, Richmond, New South Wales.

SERVICE AVIATION (CONTINUED)

AIR FORCE CROSS.

AMBLER, WING COMMANDER GEOFFREY HILL, Auxiliary Air Force.
ATCHERLEY, SQUADRON LEADER (now WING COMMANDER) RICHARD LLEWELLYN ROGER.
DONALDSON, SQUADRON LEADER JOHN WILLIAM, D.S.O. (Since reported missing.)
GILSON, SQUADRON LEADER OLIVER INGHAM.
MERMAGEN, SQUADRON LEADER HERBERT WALDEMAR.
PURVIS, SQUADRON LEADER (now WING COMMANDER) HARRY ALEXANDER, D.F.C.
THYNNE, SQUADRON LEADER (now WING COMMANDER) BRIAN SHERIDAN, Auxiliary Air Force.
LORD WILLOUGBY DE BROKE, SQUADRON LEADER (now WING COMMANDER), M.C., Auxiliary Air Force.
THWAITES, FLIGHT LIEUTENANT EVELYN HARRY TOLLER.
PINKHAM, ACTING FLIGHT LIEUTENANT (now ACTING SQUADRON LEADER) PHILIP CAMPBELL.
PEBODY, FLYING OFFICER JACK ETHELBERT.
BAILEY, WARRANT OFFICER (now FLYING OFFICER) LEONARD SHAW MEADOWS.
ROBB, AIR COMMODORE JAMES MILNE, D.S.O., D.F.C.
TRURY, SQUADRON LEADER EDWARD STEPHEN.
GROOM, SQUADRON LEADER ALBERT EDWARD, M.B.E., D.S.M.
MACKENZIE, SQUADRON LEADER IAN WILFRED CAMPBELL.
MARLOW, SQUADRON LEADER HUGH WHITTAL.
MOIR, SQUADRON LEADER JAMES FRANCIS.
RAMSBOTTOM-ISHERWOOD, SQUADRON LEADER HENRY NEVILLE GYNES.
CAMPBELL, ACTING SQUADRON LEADER THOMAS WIGHT, R.A.F.O.
MALING, FLIGHT LIEUTENANT JAMES RICHARD.
SCHERGER, WING COMMANDER FREDERICK WILLIAM, ROYAL AUSTRALIAN AIR FORCE.

AIR FORCE MEDAL.

HALL, FLIGHT SERGEANT GEORGE PATRICK.
HUMPHREY, FLIGHT SERGEANT LESTER FRANCIS.
LILLYWHITE, FLIGHT SERGEANT GEORGE EDWARD
PLESTED, FLIGHT SERGEANT KENNETH JOHN.
SHIPPOBOTHAM, FLIGHT SERGEANT (NOW WARRANT OFFICER) HEDLEY PICTON.

ADDITIONAL MEMBER OF THE MILITARY DIVISION OF THE SECOND CLASS, OR KNIGHTS COMMANDERS, OF THE MOST HONOURABLE ORDER OF THE BATH.

PEIRSE, ACTING AIR MARSHALL RICHARD EDMUND CHARLES, C.B., D.S.O., A.F.C.

ADDITIONAL MEMBER OF THE MILITARY DIVISION OF THE THIRD CLASS, OR COMPANIONS, OF THE MOST HONOURABLE ORDER OF THE BATH.

DOUGLAS, AIR VICE-MARSHAL WILLIAM SHOLTO, M.C., D.F.C.

TO BE ADDITIONAL COMMANDERS OF THE MILITARY DIVISION OF THE MOST EXCELLENT ORDER OF THE BRITISH EMPIRE.

NUTTING AIR COMMODORE CHARLES WILLIAM, O.B.E., D.S.C.
SHEKLETON, GROUP CAPTAIN ALEXANDER, D.S.O., O.B.E.
ISITT, GROUP CAPTAIN LEONARD MONK, ROYAL NEW ZEALAND AIR FORCE.

TO BE ADDITIONAL OFFICERS OF THE MILITARY DIVISION OF THE MOST EXCELLENT ORDER OF THE BRITISH EMPIRE.

BILNEY, WING COMMANDER CHRISTOPHER NEIL HOPE.
CHINERY, WING COMMANDER CECIL FERDINAND.
PERRY-KEENE, WING COMMANDER ALLAN LANCELOT ADDISON.
WALTERS, WING COMMANDER ALBERT (ACTING GROUP CAPTAIN).
TAAFFE, SQUADRON LEADER RUDOLPH TREVOR (NOW WING COMMANDER).
HEWITT, WING COMMANDER JOSEPH ERIC (TEMPORARY GROUP CAPTAIN, ROYAL AUSTRALIAN AIR FORCE.
BURRELL, WING COMMANDER HUGH BARTHOLOMEW, ROYAL NEW ZEALAND AIR FORCE

TO BE ADDITIONAL MEMBERS OF THE MILITARY DIVISION OF THE MOST EXCELLENT ORDER OF THE BRITISH EMPIRE.

KENDALL, FLYING OFFICER ALEX BADEN (NOW ACTING FLIGHT LIEUTENANT).
MILLYARD, FLYING OFFICER HARRY LESLIE
SCRAGG, FLYING OFFICER COLIN.
KEMP, WARRANT OFFICER MONTAGUE.
OLDLAND, WARRANT OFFICER FREDERICK JAMES DANIEL.
PACELLO, WARRANT OFFICER EDWARD ARTHUR.
RICHARDSON, WARRANT OFFICER WILLIAM DILLARSTONE.
USHER, WARRANT OFFICER ALBERT WILLIAM
WAY, WARRANT OFFICER DAVID TEMPLE.
HACKFATH, FLYING OFFICER CHARLES ROY, ROYAL AUSTRALIAN AIR FORCE.
UPTON, SERGEANT MAJOR, CLASS 1, SAMUEL HARLAND WOODBURN, ROYAL AUSTRALIAN AIR FORCE.
RAWNSLEY, FLIGHT LIEUTENANT IVAN EDWARD, FOVAL NEW ZEALAND AIR FORCE.

SERVICE AVIATION (CONTINUED)

GILES, FLYING OFFICER ALBERT TOM, ROYAL NEW ZEALAND AIR FORCE.
DUNCAN, WARRANT OFFICER JAMES EDWARD, ROYAL NEW ZEALAND AIR FORCE.

MEDAL OF THE MILITARY DIVISION OF THE MOST EXCELLENT ORDER OF THE BRITISH EMPIRE, FOR MERITORIOUS SERVICE.

LUKE, FLIGHT SERGEANT FRANCIS DRAKE.
STARLING, FLIGHT SERGEANT WILLIAM CHARLES JAMES.
ELLIS, SERGEANT CLIFTON EDWARD.
GILBERT, SERGEANT (NOW FLIGHT SERGEANT) ALBERT JOHN.
RUSHWORTH, SERGEANT ERNEST THOMAS.
MONKMAN, CORPORAL HAROLD.

Princess Mary's Royal Air Force Nursing Service

ROYAL RED CROSS (FIRST CLASS).

JACKSON, MATRON MISS JESSIE DOROTHY.
In recognition of exceptional devotion and competency displayed in the nursing and care of the sick in Royal Air Force hospitals at home and abroad.

ROYAL RED CROSS (SECOND CLASS).

GARNETT, ACTING MATRON MISS MARGARET ELLEN.
MACVICAR, ACTING MATRON MISS MARY ANNE.
POLUS, SENIOR SISTER MISS ROSINA EMMA CAROLINE.

In recognition of special devotion and competency displayed in the nursing and care of the sick in Royal Air Force hospitals at home and abroad.

MENTIONS IN DESPATCHES.

A.V-M. E. L. Gossage, C.B., C.V.O., D.S.O., M.C.; A.V-M. T. L. Leigh-Mallory, D.S.O.; A.V-M. R. E. Saul, D.F.C.; A.V-M. C. D. Breese, C.B., A.F.C. (Acting); A.V-M. F. J. Linnell, O.B.E. (Acting); A.V-M. R. G. Parry, D.S.O. (Acting); Air Cmdre. A. J. Capel, D.S.O., D.F.C.; Air Cmdre. A. D. Cunningham, C.B.E.; Air Cmdre. G. B. Dacre, D.S.O.; Air Cmdre. J. C. Quinnell, D.F.C.; Air Cmdre. A. D. Warrington-Morris, C.M.G., O.B.E.; Group Capt. G. H. Boyce, A.F.C.; Group Capt. Le B. Croke; Group Capt. G. G. Dawson; Group Capt. R. M. Field; Group Capt. L. T. N. Gould, M.C.; Group Capt. H. G. Jones; Group Capt. H. M. Probyn, D.S.O.; Group Capt. S. C. Stafford, D.F.C.; Group Capt. H. S. P. Walmsley, O.B.E., M.C., D.F.C. (Acting); The Reverend S. H. Keen, Chaplain; Capt. C. W. L. Meynell, Royal Navy; Wing Cdr. C. H. Appleton; Wing Cdr. E. C. Barlow (Missing); Wing Cdr. R. L. Crofton, M.B.E., A.F.C.; Wing Cdr. C. J. S. Dearlove; Wing Cdr. D. M. Fleming; Wing Cdr. E. A. Hodgson; Wing Cdr. L. W. Jarvis; Wing Cdr. W. A. Opie; Wing Cdr. R. Reay-Jones; Wing Cdr. G. W. Tuttle, D.F.C.; Wing Cdr. T. M. Williams, M.C., D.F.C.; Wing Cdr. W. H. Day (Acting), R.A.F. Volunteer Reserve; Wing Cdr. G. Shaw (Acting), Auxiliary Air Force; Cdr. A. M. Rundle, Royal Navy; Sqn. Ldr. E. Coleman, D.F.M.; Sqn. Ldr. D. I. Coote; Sqn. Ldr. J. A. Hawkings; Sqn. Ldr. F. S. Hodder; Sqn. Ldr. J. Kemper, M.B.E., R.A.F.O.; Sqn. Ldr. D. M. T. Macdonald; Sqn. Ldr. C. C. McMullen; Sqn. Ldr. G. I. Marvin; Sqn. Ldr. N. C. Pleasance; Sqn. Ldr. S. W. Thomas; Sqn. Ldr. C. L. Thompson; Sqn. Ldr. W. H. N. Turner, D.F.C. (Missing); Sqn. Ldr. J. E. V. Tyzack; Sqn. Ldr. M. F. D. Williams; Sqn. Ldr. W. H. Bigg (Acting), R.A.F.O.; Maj. J. C. R. Fitzgerald-Lombard (Acting), Royal Engineers); Flt. Lt. W. T. Buckle, M.B., Ch.B.; Flt. Lt. C. B. Hull, D.F.C.; Flt. Lt. T. H. Kirk, R.A.F. Volunteer Reserve; Flt. Lt. J. S. O'Brien; Flt. Lt. P. W. Townsend; Flt. Lt. P. R. Beare (Acting); Flt. Lt. P. E. Bennett (Acting); Flt. Lt. D. G. E. Benzie (Acting), Auxiliary Air Force; Flt. Lt. W. A. H. Cullum (Acting); Flt. Lt. S. R. Gibbs (Acting); Flt. Lt. C. S. Goode (Acting), R.A.F. Volunteer Reserve; Flt. Lt. J. R. Patterson (Acting), R.A.F. Volunteer Reserve; Flt. Lt. C. D. W. Price (Acting); Flt. Lt. R. H. Winfield (Acting); F/O. R. H. Batt; F/O. H. Budden; F/O. B. W. Hayward (Missing); F/O. J. E. Horton; F/O. A. H. King; F/O. G. V. Proudman; F/O. D. McLaren; F/O R. N. Selley; F/O. S. D. Slocum (Killed in Action); W/O. S. W. Byrne; W/O. T. Carroll; W/O. B. A. Chatfield; W/O. E. W. Etteridge; W/O A. H. F. Murphy; W/O. W. C. Steel; Flt. Sgt. G. A. Corby (Killed in Action); Flt. Sgt. W. R. Dunlop; Flt. Sgt. B. G. Preston; Flt. Sgt. F. J. C. Stephens; Flt. Sgt. C. R. Wheeler; Flt. Sgt. R. S. F. Williams; Flt. Sgt. L. Hills (Acting); Flt. Sgt. J. H. Maddern (Acting); Sgt. T. W. Bowles (Missing); Sgt. F. C. Clarke; Sgt. A. V. Clowes; Sgt. E. Cotton; Sgt. A. J. Edwards; Sgt. D. C. Hide, R.A.F. Volunteer Reserve; Sgt. J. E. Kimberley; Sgt. E. Phillipson; Sgt. S. Vinall; Cpl. J. A. Batte; Cpl. F. W. Collins; Cpl. W. V. Couch; Cpl. H. Perry, D.F.M.; Cpl. A. C. P. Walker, R.A.F. Volunteer Reserve; Cpl. S. J. Webb; L.A/C. J. Bartley; L.A/C. E. Beynon (Missing); L.A/C. J. A. Butcher (Killed in Action); L.A/C. R. G. Cornish, R.A.F. Volunteer Reserve; L.A/C. A. J. Heller; L.A/C. R. Jackson; L.A/C. R. F. Jones; L.A/C. J. Logan; L.A/C. R. A. Mutton (Killed in Action); L.A/C. W. A. Price; L.A/C. T. R. Turner; L.A/C. T. H. Westlake; L.A/C. G. Whitehead; L.A/C. A. C. Wilson; L.A/C. E. R. W. Wood; A/C.1 W. C. Druett; A/C.1 H. J. Harper.

ANGLO-EGYPTIAN: Fighter pilots and their Gladiators of the R.E.A.F. In the background are some Ansons which, presumably, are as good for sandy wastes as watery wastes.

Roll of Honour

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed.

KILLED IN ACTION (WHILE FLYING IN OPERATIONS AGAINST THE ENEMY).—Blowfield (77782), P/O. P. H.; Bush (40886), P/O. C. G.; Drawwater (40374), P/O. M. I.; Grant (749442), L.A/C. D. L.; McQueen (993914), Sgt. R. R.; Olley (520817), L.A/C. R.; Reed (937139), Sgt. A.; Sisman (42536), P/O. B.

PREVIOUSLY REPORTED "MISSING BELIEVED KILLED," NOW PRESUMED "KILLED IN ACTION."—Antell (564245), Sgt. W. F.; Atkins (580817), Acting Sgt. W. J.; Bagley (528429), A.C.1 J. C.; Beaumont (516285), A.C.1 H. E.; Boram (580708), Acting Sgt. B. T.; Brace (563894) Sgt. R. H. J.; Cockayne (550939), Cpl. H. J.; Downey (561103), Flt. Sgt. W. H.; Ellis (628712), A.C.2 W. J.; Forsyth (520361), L.A/C. R.; Grimes (41237), P/O. J .H.; Hammond (580734), Sgt. R. R.; Healey (562536), Flt. Sgt. J. E. K.; Heywood (523569), A/C.1 R.; Hodge (531390), L.A/C. D. G.; Hulme (580342), Sgt. H.; Hunter (523436), Cpl T.; Johnson (552464), A/C2 F. J.; Jones (563978), Sgt. T. E.; Lewis (40399), P/O. N. L.; Lines (70892), P/O. F. N.; Macmillan (526547), Sgt. V. D.; Pountain (618060), A/C2 W. H.; Simton (517970), L.A/C. J. H.; Speirs (39801), F/O. J. H. C.; Watson (567346), A/C.1 C.

PREVIOUSLY REPORTED "MISSING," NOW PRESUMED "KILLED IN ACTION."—Allison (70769), F/O. D. B.; Atkinson (39646), F/O. J. E.; Bailey (39924), F/O. D. C. E.; Black (567249), Cpl. R. T.; Bourne (40882), P/O. A. H. R.; Briden (39706), F/O. M. F.; Challes (39041), F/O. J. T. I.; Cox (566740), L.A/C. G. E.; English (524025), Sgt. T. H.; Guthrie (34155), A.S/L. A. J.; Key (520262), L.A/C. J. M. F.; Leighton (547262), A/C.2 I. D.; Marlin (550205), L.A/C. T. L.; Mason (580718), Sgt. F. M.; Pickess (580809), Sgt. B. J.; Richardson (564063), Sgt. V. H. G.; Telfer (531938), A.C.1 A.; Turnbull (521968), Sgt. J. B. A.; Tyrrell (516328), Sgt. H. W.; Warren (547949), A/C.1 P. J.

PREVIOUSLY REPORTED "MISSING," NOW REPORTED "KILLED IN ACTION."—Alderson (56354), Sgt. K.; Atchinson (580497), Sgt. T. T.; Battrick (516469), Sgt. R. H. J.; Fennell (40293), P/O. E. O.; Jones (624943), A/C.2 T.; McLaren (35151), A. Flt. Lt. I. L.; Poad (551624), L.A/C. T.; Searle (42962), P/O. F. M. N.; Taylor (540413), L.A/C. A. J.

WOUNDED OR INJURED IN ACTION.—Austin (90258), F/O. G. W. B.; King (516157), Sgt. H. W.; Kitson (70865), P/O. E. K.; McNay (741569), Sgt. A.

MISSING, BELIEVED KILLED IN ACTION.—Barber (745841), A. Sgt. J. D.; Biggins (550227), Sgt. G. K.; Jones (581185), Sgt. M. G.; Juggins (562162), Sgt. J. G.; Knott (590277), Flt. Sgt. R. H.; Mason (70450), F/O. W. R. P. K.; Toner (610188), L.A/C. J. P.; Werner (42289), P/O. R. H.

MISSING.—Adams (41645), P.O. L. S.; Ainslie (37310), Flt. Lt. A. S., D.F.C.; Alderslade (903455), Sgt. J. W. T.; Anderson (532047), Sgt. W. F.; Bailey (755360), Acting Sgt. F. E. G.; Bartlett (755198), Sgt. S. K.; Battye (518638), Cpl. G. A.; Beevers (564349), Sgt. C. S. G.; Belcher (580477), Sgt. E. J.; Borrows (624811), Sgt. J. F.; Brayshaw (526610), Cpl. J. C.; Burnett (619744), Sgt. R.; Chard (21476), Flt. Sgt. W. F.; Clark (749331), Sgt. A. M.; Cooper (550541), Sgt. K.; Crockart (32155), Acting Wing Cdr. N. D.; Crockett (570634), A/C.1 D. T.; Crohill (518932), L.A/C. A. F.; Cronan (42109), P/O. J. R.; Davidson (751113), Acting Sgt. A. J.; Davies (37796), Flt. Lt. J. W. E., D.F.C.; Denison (552584), Sgt. H. T.; Dixon (532692), L.A/C. J. J.; Dutton (547594), Sgt. R. L. J.; Elder (70787), F/O. C. F.; Ennis (70896), P/O. A. C.; Gainsford (80575), Sgt. G. P.; Gard (41840), P/O. P. J.; Gaylard (41398), P/O. G. N.; Grant (615683), A/C.1 A.; Gray (548063), Sgt. W. H.; Grieg (548517), Sgt. J. W.; Harding (580426), Sgt W. C.; Harris (663054), A/C.1 F.; Harrison (527017), Sgt. D. S.; Hastings (33028), Sqn. Ldr. M.; Hawkins (581510), Sgt. D. C.; Hayes (522076), L.A/C. A. G. N.; Hemsworth (541752), A/C.1 G.; Hill (580654), Sgt. H. G.; Houghton-Brown (581100), Sgt. R.; Ingram (580958), Sgt. A. J. D.; Jenkins (40832), P/O. M. T. E.; Jones (544901), L.A/C. R. T.; Jordan (629644), Sgt. T. C.; Judd (514945), Cpl. J.; Kelso (581155), Sgt. A. D.; Kempster (627208), Sgt. A.; Lancaster (755199), Sgt. A. O.; Langford (581228), Sgt. A. B.; Lea (77273), P/O. B. C.; Lidstone (747853), Sgt. R. C.; Light (640246), A/C.2 T.; Lloyd (591596), L.A/C. P. L.; Lothian (42717), P/O. I. F.; Lumb (75169), P/O. R. F.; Luxmoore (40628), P/O. A. S.; Malcolm (523441), L.A/C. C. A.; McPhie (40730), P/O. J. F.; Morgan (581292), Sgt. R.; Morris (536055), L.A/C. E. R.; Morton (741362), Sgt. J. S.; Needham (742691), Sgt. J. W.; Newton (40785), F/O. K. E.; Parsons (534295), A/C.1 F.; Pascoe (40746), P/O. A. G.; Peacock (620950), L.A/C. E.; Pearce (530460), A/C.1 J. T.; Percy (42640), P/O. R. A.; Pike (43479), P/O. D. I.; Pilling (29178), Sqn. Ldr H.; Pursglove (516705), Sgt. F.; Quirke (42646), P/O. J. P.; Radford (564970), Sgt. R. H.; Roche (581031), Sgt. F. A. S.; Ross (617913), A/C.1 T. W.; Saunders (577342), A/O. E. I.; Saunders (51999), Sgt. F. A.; Scoins (624090), A/C.1 D. J.; Seagrim (39176), F/O H. J.; Senthey (514566), Flt. Sgt. W. T. J.; Smith (550966), Sgt. A. H.; Spickett (516666), Sgt. W. A.; Stanley (520757), Sgt. A. A.; Storey (538833), Sgt. H. A.; Swainston (90610), P/O. A.; Thomson (755699), L.A/C. J. G.; Thorley (751531), Sgt. C. W.; Traynor (268892), L.A/C. L.; Trolove (36183), P/O. P. N.; Turner (614601), Sgt. E. H. MacK.; Wales (41968), P/O. A. R.; Warcup (33294), Flt. Lt. P. E.; Weil (41971), P/O. P.; White (627575), L.A/C. J.; Wilcock (641922), A/C.2 J.; Williams (41974), P/O. H. S. P.; Williamson (530579), L.A/C. J. A.; Willoughby (564351), Sgt. F. J.; Winston (935571), Sgt. J. C.; Worboys (41516), P/O. C. R.; Wyatt (40563), P/O. G. M.

MISSING, BELIEVED KILLLED ON ACTIVE SERVICE (while engaged in non-operational flying duties or on the ground through enemy action).—Davies (51115), A/C.1 L. L.; Doak (965128), A/C2 J.; Dowling (580565), Sgt. A. N.; Gardiner (548223), A/C.1 H. H.; Johnston (41426), P/O. D. S.

KILLED ON ACTIVE SERVICE.—Glover (742508), Sgt. R. T.; Haines (742106), Sgt. R. W.; Hawthorne (745962), Sgt. N. R. A.; Ingham (26201), Sqn. Ldr. E. C.; Pascoe (526360), Sgt. T. G. J.; Sankey (77473), P/O. R. C.; Walker (627496), A/C.2 P. L.

PREVIOUSLY REPORTED "MISSING," NOW PRESUMED "KILLED ON ACTIVE SERVICE."—Boyd (619108), A/C.1 J.; Bruce (524136), Sgt. R. G. Dickson (33164), Flt. Lt. F. O.; Gould (33312), F/O. D. E.; Whistler (03100), Group Capt. H. A., D.S.O., D.F.C.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Corby (70139), F/O. J. C.; Ladyman (41851), P/O. S. C.; Lindsell (42616), P/O. A. G. H.; McFarlane (569019), L/AC. V. T.; Maggs (79357), P/O. M. H.; Willis-Richards (619034), Sgt. J. W.

DIED OF WOUNDS OR INJURIES ON ACTIVE SERVICE.—Haselden (741905), Sgt. J. H.

DIED ON ACTIVE SERVICE.—Armitstead (79094), P/O. T.; Bell (512107), Cpl. R.; Bowery (519354), Sgt. F.; Dale (645202), A/C.2 G. H.; Flavell (551548), L.A/C. T. J. P.; Frear (646517),

SERVICE AVIATION (CONTINUED)

A/C.2 G. R.; Macarthur (969846), A/C.2 J. B.; Moore (873758), A/C.1 R.; Parkins (966977), A/C.2 S. E.; Reed (226215), L.A/C. D. H.; Westlake (958409), A/C.2 J. M.

PREVIOUSLY REPORTED "MISSING," NOW REPORTED "SAFE."—Mansel (561305), Sgt. G. D.; Murray (612345), Sgt. K. E.; Robson (562271), Sgt. G.

PREVIOUSLY REPORTED "MISSING," NOW REPORTED "WOUNDED OR INJURED IN ACTION."—Bennett (580299), Sgt. G. C.

PREVIOUSLY REPORTED "MISSING," NOW REPORTED "PRISONER OF WAR."—Ainsworth (521745), A/C.1 R. T.; Breese (33303), Flt. Lt. J. C.; Brooks (622115), A/C.1 J. S.; Byrne (37595), F/O. V. G. L. D.; Collard (580892), Sgt. F. C.; Fancy (524851), Sgt. J.; Lowe (581231), Sgt. R.; Mackenzie (552160), L.A/C. J. H.; Miller (404111), P/O. L.; Potts (40941), P/O. I. G. G.; Wootton (740463), Sgt. J. W.; Wright (40279), F/O. G. O. M.

ROYAL AUSTRALIAN AIR FORCE.

MISSING.—Bell, Flt. Lt. J. N.; Harris (1730), Sgt. C. W.

Royal Air Force

General Duties Branch.

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation with effect from the dates stated and seniority of April 25:—Flight Sergeants: (June 13) L. G. James; (June 15) L. R. C. Russell; (June 17) E. P. S. Booker; H. B. Harries; (June 19) R. H. Thomas; (June 20) E. P. M. Fernbank; C. Holdway. Sergeants: (June 13) R. Bailey; (June 14) N. S. C. Chapman; G. A. L. Elliot; (June 15) G. Cherrington; K. S. McMurdie; J. W. White; (June 17) R. R. Keiller; L. J. T. West; L. Wakelin.

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation with effect from the dates stated and seniority of May 9:—Flight Sergeants: (June 13) S. D. Harvey; (June 14) W. R. Mitchell; (June 15) G. E. Lillywhite. Sergeants: (June 12) J. L. Evans; (June 13) W. H. Sheen; (June 14) E. V. Asplin; H. Harvey; (June 22) A. W. Belbin. Leading Aircraftman: (June 21) F. H. King.

The undermentioned Sergeants are granted commissions for the duration of hostilities as Pilot Officers on probation with effect from the dates stated and seniority of May 30:—(June 25) D. B. Clifford; (June 26) A. G. A. Cochrane; W. M. Collins; A. E. Skelton.

L.A/C. J. Trueman is granted a commission for the duration of hostilities as Pilot Officer on probation. (June 17.)

Sqn. Ldr. T. R. Vickers is granted a permanent commission in the substantive rank of Squadron Leader. (May 16.)

The undermentioned Pilot Officers on probation are confirmed in their appointments on the dates stated:—(March 6) D. Bayliss; W. T. Davies; (May 1) N. E. Pocock; (May 15) S. Ault; L. W. Basan; J. Beveridge; S. A. F. Bowen; S. G. Cooper; A. G. Crockett; A. T. Darling; J. L. Groves; T. A. Grundy; T. L. Hogg; G. I. Jerdein; N. M. H. Knowles; R. H. McDonald; P. Moller; L. C. Quick; A. Tofield; P. J. S. Boggis; C. R. Dwight; (May 16) J. R. Hamar; D. E. Pinchbeck; (May 30) M. T. H. Adams; J. F. W. Allen; H. C. M. Bamber; E. F. V. Copsey; C. S. Courtney-Clarke; D. F. Davies; N. Davson; T. Dawson; J. M. Ennis; J. A. Heath-Brown; A. J. Hereford; D. J. Isted; P. F. Kennard-Davies; I. H. Kingwell; P. W. Lovell; T. D. Misselbrook; E. S. S. Nash; V. Parker; J. F. Percival; E. G. Pett; H. A. R. Prowse; R. E. Ransome; E. B. Rendall; E. S. Roberts; R. R. Sandford; B. Smith; D. D. Snooke; A. J. Stevens; R. P. Wigley-Jones; R. W. A. Britton; J. G. K. Long.

The undermentioned Acting Pilot Officers on probation are graded as Pilot Officers on probation on the dates stated:—(April 10) I. H. Stewart; (April 20) W. P. Collins; J. Dean; H. T. Gilbert; E. J. Lester; A. G. McAfee; T. S. H. Mainland; R. F. S. Marriott; R. Mottram; D. E. F. Powell; R. M. Pugh; F. W. F. S. Russell; P. D. Short; P. A. W. Thomas; J. R. Topham; D. Q. W. Tracy.

Flt. Lt. G. A. Richmond is promoted to the temporary rank of Squadron Leader. (June 1.)

The undermentioned Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—(May 19, Seniority May 19, 1939) W. S. G. Maydwell (L., The Somerset Light Infantry); (May 21) H. A. Hornblow; (June 19) S. W. B. Menaul; K. Ault; D. E. Bennett.

The undermentioned Pilot Officers are promoted to the rank of Flying Officer on the dates stated:—(December 24, 1939) G. Robinson; (April 23) R. R. P. Fisher; C. N. McVeigh; (May 10) T. H. Myers; (May 25) R. J. Allanson; (June 27) R. G. L. Lawson; I. R. C. Macpherson; J. R. J. Rail; M. T. Wainwright; T. Smart.

Air Commodore R. M. Drummond, D.S.O., O.B.E., M.C., is granted the acting rank of Air Vice-Marshal. (June 19.)

F/O. R. P. Nelms relinquishes the acting rank of Flight Lieutenant. (April 13.)

P/O. R. J. B. Roach takes rank and precedence as if his appointment as Pilot Officer bore date March 9. Reduction to take effect from June 10.

Group Capt. A. W. F. Glenny, M.C., D.F.C., is placed on the Retired List. (July 1.)

P/O. F. E. Bardell (2nd Lt., R.A.) relinquishes his temporary commission on return to Army duty. (June 11.)

The commissions of the undermentioned are terminated on cessation of duty on the dates stated:—Pilot Officer on probation: (June 29) E. B. Cook. Acting Pilot Officer on probation: (May 11) H. D. Willis.

Errata.

In the following London Gazettes, Notifications concerning the undermentioned should have appeared under the heading "ROYAL AIR FORCE VOLUNTEER RESERVE" instead of "ROYAL AIR FORCE."

In the Gazette of March 19, Sgt. F. J. Swain; Cpl. H. E. Grellis; L.A/C. R. C. Fishlock.

In the Gazette of March 26th, L.A/C. H. E. Day.

In the Gazette of May 14, Flight Sergeants: J. Hart; W. J. Johnson. Sergeants: W. Anderson; W. D. Evans; F. Holt.

In the Gazette of May 21, Flt. Sgt. J. L. Hubbard.

The notification in the Gazette of May 28 concerning the undermentioned is cancelled:—Flight Sergeants: H. W. O. Palethorpe; R. Parr. Sergeant: J. S. W. Bignal.

Balloon Branch.

The undermentioned are granted commissions for the duration of hostilities as Flying Officers on probation with effect from the dates stated and with seniority of April 25:—Warrant Officer: (June 13) T. W. Wiseman. Temp. Warrant Officer: (June 17) G. Blair.

Technical Branch.

The undermentioned Warrant Officers are granted commissions for the duration of hostilities as Flying Officers on probation with effect from the dates stated and with seniority of February 15:—(February 16) C. W. Johnstone; (June 6) A. J. Mott; (June 10) J. F. Williams.

The undermentioned are granted commissions for the duration of hostilities as Flying Officers on probation with effect from the dates stated and with seniority of March 14:—Warrant Officers: (April 1) J. Mann; (April 2) L. A. Sparks; (May 6) H. Lee; (May 9) E. J. G. Hill; (May 29) H. P. Matthews; (June 11) W. J. Hendley; (June 12) V. C. Jarvis; (June 18) F. H. Mumford; (June 20) A. Hamilton. Temp. Warrant Officer: (May 1) L. S. Pegg.

The undermentioned are granted commissions for the duration of hostilities as Flying Officers on probation with effect from the dates stated and with seniority of May 9:—Warrant Officers: (May 29) J. H. Osborne; (June 12) E. R. Cuff; (June 14) A. A. Austin; H. G. Goacher; W. H. Holmes; (June 15) C. Barton; E. A. Francis; A. E. Petersen; (June 16) A. E. Nicol; W. E. Palmer; (June 17) G. A. Bone; A. W. D. How; (June 19) A. J. Gilbert; L. B. P. Leeson; (June 20) A. G. Hawkes. Temp. Warrant Officers: (June 15) F. C. Pope; (June 17) A. Mellor; (June 18) J. R. Fraser; (June 19) E. Swinney.

The undermentioned are granted commissions for the duration of hostilities as Flying Officers on probation with effect from the dates stated and with seniority of May 23:—Warrant Officers: (June 13) H. C. Haley; (June 22) A. G. Sancto. Temp. Warrant Officer: (June 12) E. A. Goodwin.

The undermentioned Flight Sergeants are granted commissions for the duration of hostilities as Pilot Officers on probation with effect from the dates stated and with seniority of May 16:—(June 13) R. D. Romanis; (June 14) A. W. Tillman.

The undermentioned Flight Sergeants are granted commissions for the duration of hostilities as Pilot Officers on probation with effect from the dates stated and with seniority of May 30:—(June 15) A. G. Boggis; (June 17) C. G. N. White.

The undermentioned Flying Officers on probation are confirmed in their appointments on the dates stated:—(June 12) J. W. Faulkner; W. J. Elvin; A. H. Burleigh; (June 23) A. J. Wild; T. A. Scarff; H. Wright.

The undermentioned Flying Officers are promoted to the rank of Flight Lieutenant with effect from July 1 and seniority of May 18:—A. E. Clayson; A. E. Pearce; P. H. Scoley.

Administrative and Special Duties Branch.

W/O. G. B. Danton is granted a commission for the duration of hostilities as Flying Officer on probation with effect from May 2 and with seniority of March 7.

The undermentioned are granted commissions for the duration of hostilities as Flying Officers on probation with effect from the dates stated and with seniority of May 2:—Warrant Officers: (June 3) J. Leckie; (June 16) J. P. E. Pope. Temp. Warrant Officer: (May 23) E. O. Budd.

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation with effect from the dates stated and with seniority of April 25:—Flight Sergeants: (May 31) A. S. Cooper; (June 18) A. G. Webb. Temp. Flight Sergeants: (May 25) P. Duxfield; (June 17) S. A. Bennett. Sergeants: (June 4) J. W. Taylor; (June 21) J. C. Crockard. Temp. Sergeant: (May 29) A. H. C. Plunkett. Leading Aircraftman: (June 10) W. H. Scorer.

Equipment Branch.

Temp. W/O. D. C. Urquhart is granted a commission for the duration of hostilities as Flying Officer on probation with effect from June 15 and with seniority of May 2.

The undermentioned Sergeants are granted commissions for the duration of hostilities as Pilot Officers on probation with effect from May 7 and with seniority of May 2:—H. W. Ford; E. F. Hales.

Flt. Lt. B. O. Cannon is promoted to the temporary rank of Squadron Leader. (June 1.)

P/O. S. R. W. Amor is promoted to the rank of Flying Officer. (May 1.)

F/O. A. W. Bridger is transferred to the Administrative and Special Duties Branch. (June 24.)

Accountant Branch.

The undermentioned Warrant Officers are granted commissions for the duration of hostilities as Flying Officers on probation with effect from the dates stated and with seniority of April 18:—(May 2) L. W. Alford; (June 12) L. Firth.

W/O. W. J. Stewart is granted a commission for the duration of hostilities as Flying Officer on probation with effect from June 15 and with seniority of May 2.

The undermentioned Warrant Officers are granted commissions for the duration of hostilities as Flying Officers on probation with effect from the dates stated and with seniority of June 6:—(June 15) G. H. Perry; (June 17) J. P. Currey.

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation with effect from the dates stated and with seniority of June 6:—Temp. Warrant Officer: (June 15) A. G. Holland. Act. Warrant Officer: (June 22) D. H. Mann. Flight Sergeants: (June 14) W. L. Whittaker; (June 17) C. Bryant; G. Whatling; (June 18) E. B. Moore; (June 19) J. W. Holmes; (June 20) J. R. Copstake; (June 21) E. W. Kirby. Temp. Flight Sergeants: (June 15) G. F. Caines; (June 16) J. G. Lister. Sergeants: (June 13) F. S. Stewart; (June 15) G. M. Gibson.

The undermentioned Flying Officers are promoted to the rank of Flight Lieutenant:—(June 12) D. W. J. Brown; J. B. H. Hobin.

Medical Branch.

The undermentioned Flying Officers are promoted to the rank of Flight Lieutenant June 5, with seniority June 5, 1939:—J. M. Clark, M.B., Ch.B.; H. J. Trenchard, M.B., Ch.B., M.R.C.P.

Sqn. Ldr. P. H. Musgrave is placed on the retired list on account of ill-health. (July 9.)

Chaplains Branch.

The Rev. A. H. Paget-Wilkes, M.A., resigns his commission. (June 21.)

Princess Mary's Royal Air Force Nursing Service

Sister Miss M. Laverack resigns her appointment. (June 21.)

Royal Air Force Reserve

RESERVE OF AIR FORCE OFFICERS.

General Duties Branch.

Capt. K. A. S. G. N. Fearnside-Speed (I.A., Ret.) is granted a commission in class CC as Flying Officer for the period July 26, 1939, to May 30, 1940, inclusive.

The undermentioned relinquish their commissions in class CC on appointment to commissions in the Royal Air Force Volunteer Reserve on the dates stated:—Flight Lieutenants: (June 26) H. C. T. Spier; (June 27) J. B. McKay. Flying Officer: (July 1) J. G. P. Drummond, M.C.

The undermentioned relinquish their commissions on cessation of duty on the dates stated:—Flight Lieutenants: (June 1) L. J. Fox; (June 27) B. G. St. John-Smith. Flying Officer: (June 28) E. A. Burton.

The undermentioned Flight Lieutenants are granted the rank of Squadron Leader on the dates stated:—(May 14) I. B. Beesley; (June 5) F. J. Sherman.

The undermentioned Pilot Officers are promoted to the rank of Flying Officer:—(March 23) C. G. Clegg; T. R. Nelson; B. L. Price; K. C. Roberts; D. J. A. Roe; F. F. Taylor; P. A. Travers; P. R. Vincent.

Flt. Lt. T. H. Wilson relinquishes his commission on account of ill-health. (July 8.)

Accountant Branch.

F/O. R. E. Steggall, M.B.E., relinquishes his commission on account of ill-health. (June 26.)

Royal Air Force Volunteer Reserve

General Duties Branch.

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation on the dates stated:—(June 8) J. C. S. Ponsford; J. K. Richardson; (June 17) A. Allan; R. J. Ashley; J. J. Pickburn.

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation on the dates stated:—Flight Sergeant: (June 20, seniority May 30) G. Ryder. Sergeants: (June 2) P. W. M. Bushnell; A. J. Cuthbert; C. F. Cardnell; A. K. Chappell; H. B. Duke-Woolley; (June 8) S. J. A. Evershed; (June 9) S. Baker; G. A. Denby; J. J. Kaye; G. H. Maffett; R. W. Foster; D. H. Hone; R. F. Ferdinand; (June 10) P. M. Cardell; I. J. A. Cruickshanks; A. R. Downer; J. H. Pickering; W. A. A. Read; (June 13) F. W. H. Darlington; (June 14, seniority April 25) H. F. Breakspear; (June 15) M. M. Henderson; D. W. E. Sharpe; J. M. McCausland; J. H. N. Molesworth; R. G. Goode; G. R. Ross; C. G. Llewellyn; A. D. Lambert;

R. G. Macleod; P. Blandford; (June 17) H. C. Barson; R. Reid; (June 18) D. J. Fielder; (June 22, seniority May 9) C. J. Batho; (June 22, seniority June 30) F. G. Roberts; (June 22) G. H. Melville-Jackson. Acting Sergeant: (June 6, seniority May 9) A. Brown. Leading Aircraftmen: (June 2) G. J. Dunthorne; T. F. V. Thomas; C. R. Woods; (June 15) W. G. Franklin; (June 16) D. S. Cox; M. J. Fisher.

The Hon. B. D. Grimston is granted a commission for the duration of hostilities as Acting Pilot Officer on probation. (May 25.)

The undermentioned Acting Pilot Officers on probation are graded as Pilot Officers on probation on the dates stated:—(May 15) A. Findlay-Effeing; F. Holmes; J. O. Mair; J. F. Palmer; M. H. Pinder; E. Reeve; R. T. Sheppard; C. C. Sherring; G. R. Watson; (June 1) T. Genney, M.C.; W. E. G. Heanly; J. Littlejohn; (June 15) J. E. Bartlett; W. L. Boon; R. V. Derbyshire; A. H. Draper; N. D. Greenaway; R. C. Rivaz; W. G. Searles; R. C. Shotter.

The undermentioned Pilot Officers are promoted to the rank of Flying Officer on the dates stated:—(January 31) F. E. Barnes; (March 27) T. L. Sandes; (June 23) A. C. Dingle.

Errata.

In the Gazette of March 5. *For* Frederick Alexandre Uray *read* Frederick Alexandre Wray.

In the Gazette of May 7. *For* 566741 Corporal Stanley Wilson *read* 566741 Corporal Thomas Stanley Wilson.

In the Gazette of May 21. *For* 740096 Sergeant Alan Haynes Quartermaine *read* 740096 Sergeant Allan Haynes Quartermaine.

Technical Branch.

H. R. A. Wood is granted a commission for the duration of hostilities as Flight Lieutenant. (June 20.)

Administrative and Special Duties Branch.

The undermentioned are granted commissions as Flight Lieutenants on the dates stated:—(June 26, seniority June 7, 1938) Lt.-Col. R. C. T. Speir (R.A.R.O.); (June 27) Capt. J. B. McKay (R.A.R.O.); (July 1) Maj. J. G. P. Drummond, M.C. (I.A., Ret.).

F. F. Wells is granted a commission for the duration of hostilities as Flight Lieutenant (March 2.) (Substituted for notification in the Gazette of April 9.)

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation with effect from the dates stated and with seniority of April 25:—Sergeant: (June 13) E. A. Evenden. Aircraftman 1st Class: (June 17) B. A. Sayers. Aircraftman 2nd Class: (June 1) S. E. Beloe; L. H. Smith.

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation on the dates stated:—(September 12, 1939) F. A. J. Burrows (substituted for notification in the Gazette of October 3, 1939); (April 29) S. A. Mercer; (May 14) E. B. Gange; (June 1) C. R. Gaffney; (June 2) R. C. Stokes; (June 4) H. C. F. Milward; (June 8) E. Appleby, M.C., M.M.; (June 10) T. A. Blanco White; R. H. Payne; F. R. Povey; (June 11) L. L. Barnard; H. M. Cotterill; H. J. Hayes; (June 12) J. H. Gem; J. C. B. Kimber; F. C. A. Thorpe; (June 13) A. C. Barton; J. F. Gibbons; S. Hulme; W. J. H. Jones; (June 14) J. H. G. Ball; R. J. Bevington; F. A. Bird; R. K. Broader; E. C. Brown; J. S. Cabot; M. B. Cookson; J. A. F. Dalgety; R. E. Dingwall; M. Gordon; G. A. A. Grant; G. T. Griffith; C. H. Higson; L. H. Ingham; W. L. Irving; N. Jenkins; G. McGregor; A. G. Smith; H. W. Ward; J. M. Wertheim; C. H. Wethered; (June 15) J. Arch; H. Bate; W. H. Corkill; H. F. Dempster; R. Duce; G. R. Fairbarns; E. T. Franklin; J. G. Garthwaite; T. H. Little; E. A. Rogers; H. Scadeng; K. S. Wood. (June 16) C. S. Draper; I. G. Paton; (June 17) W. L. Arnold; J. B. Barratt; L. G. Bristowe; C. E. Bryant, D.S.O.; B. G. S. Burleigh; J. O. Dykes; F. H. A. Hendry; L. M. Heritage; W. F. Jackman; W. Lamont; I. P. H. Preston, M.C.; A. D. Rankine; J. E. G. Robinson; B. Samways; F. Thompson; (June 18) W. G. D. Anderson; H. E. Blower; A. L. Fussell; P. G. Horlington; J. E. D. Manlove; C. Morris; A. T. S. C. Richardson; H. E. Wilson; (June 19) Lord J. C. C. Chesham, M.C.; T. B. N. Deane; G. W. Phillips; H. D. H. Radford; E. L. Raggett; W. S. J. Scruby, O.B.E.; D. T. Summerhayes; A. Swinton-Vaughan; G. L. Walters; (June 20) E. Betts; G. M. Carter; I. H. De Wynter; J. S. G. Eyre; H. A. Le Bas; E. M. Neame; A. J. Reincke; W. Sanders; (June 21) B. M. Bellasis, M.C.; W. M. Ricke; H. J. Morrish; A. H. Paget-Wilkes; H. I. C. Wyllie; (June 22) A. W. Bennett; H. Clayton-Wright; F. G. Dansey; H. H. Dicken; A. C. Dollamore; A. J. Eastwood; F. H. Field; P. E. C. Francis; W. M. Iles; T. R. Llewellyn; W. C. Morecroft; J. R. Parton; E. J. Peters; J. A. L. Rogers; R. L. S. Swanton; W. C. Ward; J. T. Woodmass; (June 24) F. J. Howard; A. Macnaghten; D. B. U. Mann; P. H. Maskell; L. Vigrass. (June 25) J. L. Rountree; (June 27) J. P. A. E. Sullivan.

Professor D. T. A. Townend is granted an honorary commission as Wing Commander whilst serving as the Royal Air Force representative on the Leeds University Joint Recruiting Board. (June 26.)

H. K. Ziegler is granted an honorary commission as Flight Lieutenant. (January 22.)

Pilot Officer on probation G. C. H. Culley is transferred to the General Duties Branch. (May 20.)

P/O. D. W. M. Prinsep resigns his commission. (March 13.)

F/O. A. D. Cameron relinquishes his commission on appointment to the Canadian Forces. June 18.)

The undermentioned relinquish their commissions on cessation of duty on the dates stated:—(July 10) Sqn. Ldr. J. E. M. Atherley; (July 3) Flt. Lt. W. T. J. Hall.

The undermentioned relinquish their commissions on account of ill-health on the dates stated:—(July 8) Flt. Lt. C. J. Farrell; (June 22) F/O. C. E. Hurst.

The commissions of the undermentioned Pilot Officers on probation are terminated on cessation of duty on the dates stated:—(May 28) R. W. Liversidge; (June 22) J. G. Long.

The notification in the Gazette of October 3, 1939, concerning Sir Edward Villiers is cancelled.

Errata.

In the Gazette of May 28. *For* Wilfred Augustine Gerard O'Brien *read* Wilfrid Augustine Gerard O'Brien and *for* Maurice Campbell Babcock *read* Maurice Campbell Badcock.

Equipment Branch.

The undermentioned are granted commissions for the duration of hostilities in the ranks and on the dates stated:—Flight Lieutenant: (June 28) J. W. Hoflin. Acting Pilot Officer on probation: (June 1) D. R. Paine.

The undermentioned Pilot Officers are promoted to the rank of Flying Officer on the dates stated:—(May 1) G. E. Clair; (May 9) N. M. Walker.

F/O. C. R. C. Marlow resigns his commission. (July 1.)

Erratum.

In the Gazette of June 25. *For* Acting Pilot Officer on probation John Geoffrey Glascow *read* Acting Pilot Officer on probation John Geoffrey Glasgow.

Accountant Branch.

Aircraftman 2nd Class R. H. Wills is granted a commission for the duration of hostilities as Pilot Officer on probation with effect from June 20 and seniority of June 6.

Medical Branch.

The undermentioned are granted commissions for the duration of hostilities in the ranks and on the dates stated:—Flight Lieutenant: (June 18) B. T. Thorne, M.B., B.Chir., M.R.C.P., M.R.C.S. Flying Officers: (June 18) P. B. Atkinson, M.R.C.S., L.R.C.P.; W. E. Bryan, M.R.C.S., L.R.C.P.; R. McP. Cross, L.R.C.P. & S.; D. O. Dickie, M.B., Ch.B., D.P.H.; G. Fraser, M.B., Ch.B.; A. G. Marshall, M.B., B.Chir., M.R.C.S., L.R.C.P.; G. L. Pett, M.B., B.S., M.R.C.S., L.R.C.P.; A. G. Riddell, M.R.C.S., L.R.C.P.; G. A. Strain, M.B., Ch.B.; P. A. Tyser, M.R.C.S., L.R.C.P.; (June 19) P. S. A. Heyworth, M.R.C.S., L.R.C.P.

Dental Branch.

The undermentioned are granted commissions for the duration of hostilities as Flying Officers:—(June 18) M. K. Butler, L.D.S.; J. C. Lawson, L.D.S.; E. Nelson, L.D.S.; D. T. Tate, L.D.S.

SERVICE AVIATION (CONTINUED)

Auxiliary Air Force

General Duties Branch.

P/O. C. R. Baron relinquishes his commission on account of ill-health. (July 8.)

The commission of A.P/O. on probation A. H. C. Boughton-Leigh is terminated on cessation of duty. (June 24.)

Administrative and Special Duties Branch.

The undermentioned Pilot Officers are promoted to the rank of Flying Officer on the dates stated:—(November 24) G. R. Thomson; (January 27) G. N. England; (February 5) E. T. Richards; (April 8) A. G. Sudworth; (May 8) W. Rathbone.

Equipment Branch.

P/O. H. Burgess resigns his commission (July 1).

Auxiliary Air Force Reserve of Officers

General Duties Branch.

Flt. Lt. J. L. Clayton is transferred to the Administrative and Special Duties Branch (May 6).

Women's Auxiliary Air Force

The undermentioned are appointed Assistant Section Officers on the dates stated:—(June 20) A/CW.2 Miss P. A. H. Atherley; A/CW.1 Miss E. H. Ayton; A/CW.1 Miss J. S. Ayton; Cpl. Miss N. D. Bainbridge; A/CW.2 Miss N. M. Bennett; A/CW.2 Miss M. A. Casey; Sgt. Mrs. M. Caudwell; A/CW.2 Miss S. M. Charles; A/CW.2 Miss N. U. C. Davis; A/CW.2 Miss M. E. Dodsworth; A/CW.1 Miss P. M. Evershed; A/CW.2 Mrs. C. Fyfe; A/CW.2 Miss M. S. Goldsbrough; A/CW.2 Miss M. M. Graham; A/CW.2 Mrs. E. A. Livingston; A/CW.2 Miss D. J. G. Nash; Cpl. Miss J. W. Orde; A/CW.1 Miss M. L. Parry; A/CW.2 Mrs. J. Paterson; Cpl. Miss G. J. Perkin; A/CW.2 Miss F. M. A. Pierce; Sgt. Miss B. A. Ralphs; Cpl. Miss K. M. Ryan; A/CW.2 Miss A. J. Thompson; A/CW.2 Miss D. M. Tyrrell; (July 1) Sgt. Miss M. Chawner; Sgt. Mrs. M. W. W. Ford; Cpl. Miss D. B. Lister; Cpl. Miss M. J. Marsh; A/CW.1 Miss H. D. Mould; A/CW.1 Miss R. M. Robertson; A/CW.2 Mrs. I. J. Rosborough; A/CW.2 Miss M. F. Shields; Sgt. Mrs. D. Sibley; Cpl. Mrs. M. M. Young; Assist. S/O. Mrs. P. M. Moss relinquishes her appointment (July 5); F/O. Mrs. L. M. Hardman relinquishes her appointment on ceasing to be employed (June 14).

AERONAUTICAL PATENT SPECIFICATIONS

29311. SPERRY GYROSCOPE CO., INC. Automatic pilots for aircraft (520,139).

29827. DORNIER-WERKE GES., and DORNIER, C. Radiator arrangements for aircraft (520,196).

31219. RHEINMETALL-BORSIG AKT.-GES., ULRICH, V., and DIENER, R. Gun-laying mechanism (520,265).

30397. KINDELBERGER, J. H. Machine gun and camera actuating mechanism (520,397).

31466. GOHN, A. A. Mounting structure for the power units of aeroplanes (520,463).

31302. BOULTON PAUL AIRCRAFT, LTD., and NORTH, J. D. Means for reloading belt-fed machine guns fed from remote ammunition storages (520,711).

31315. BRISTOL AEROPLANE CO., LTD., and BUTLER, L. F. G. Means for eliminating vibration in crank shafts and other rotating bodies (520,787).

31413. BICKEL, E. Bombs, including air mines (520,749).

31414. BICKEL, E. Anti-aircraft projectile (520,750).

32036. FAIREY AVIATION CO., LTD., and YOUNGMAN, R. T. Means for balancing the control surfaces of aircraft (520,962).

33139. MIDLAND MOTOR CYLINDER CO., LTD., and PRITCHARD, P. Brake drums and hubs for the wheels of vehicles of all kinds, and the manufacture thereof (521,351).

35752. CONSTANT SPEED AIRSCREWS, LTD., and MARSHALL, F. G. Tyre-carrying wheels (522,390).

35986. BRITISH THOMSON-HOUSTON CO., LTD. Air-conditioning systems (522,581).

29855. PAINE, H. SCOTT-. Launching torpedoes (521,403).

32084. SHAW, R. A. Form of collapsible fabric pipe for the discharge of liquids from aircraft (522,005).

34160. SERCK RADIATORS, LTD., and GARNER, E. Radiators or heat-exchange apparatus, more particularly for aircraft engines (521,651).

32971. ARMSTRONG, J. J. V. (VICKERS, H. F.). Mechanism for use in dropping bombs from aircraft (522,565).

29622. GIRLING, A. H. G. Internally expanding brakes (520,151).

29937. MAYROW, J. J. Stressed-skin structures of fuselages, wings and other hollow bodies of aircraft (520,249).

30231. BRITISH BELTING AND ASBESTOS, LTD., and FENTON, J. C. Brake-shoe linings (520,353).

30427. BARBAROU, M. J.-B. Device for mounting two aeroplane propellers coaxially and with reverse directions or rotation, comprising an offset speed-reducing gear (520,293).

31850. JUNKERS FLUGZEUG-UND-MOTORENWERKE AKT.-GES. Laying of electrical conductors and tubes in the interior spaces of aircraft (520,296).

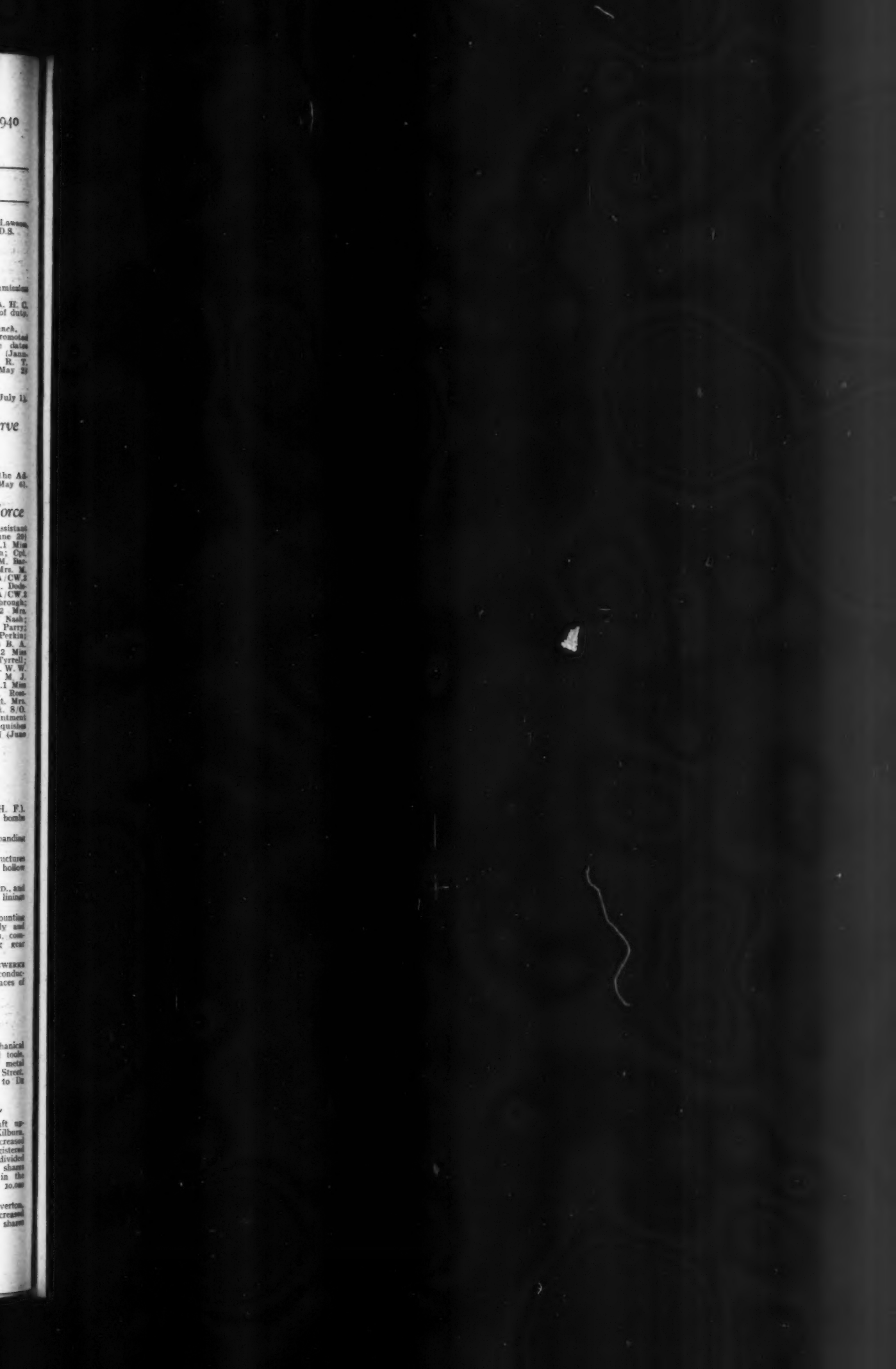
1939.

12099. FORTON, G. Airship (520,370).

CHANGE OF NAME

D.B.R. COMPANY, LTD.—General and mechanical engineers, manufacturers of machinery and tools, fuel tanks, wings, floats or other parts of metal aircraft, etc., Strangeways Ironworks, Mary Street, Strangeways, Manchester. Name changed to DE BERGUE, LTD., on April 3, 1940.

INCREASES OF CAPITAL

L. A. RUMBOLD AND CO., LTD.—Aircraft upholstery specialists, etc., Kingsgate Place, Kilburn, N.W.6. The nominal capital has been increased by the addition of £10,000 beyond the registered capital of £500. The additional capital is divided into 10,000 5 per cent. cumulative preference shares of £1. The 500 ordinary shares of £1 in the original capital have been sub-divided into 10,000 ordinary shares of 1s.

PAK PARACHUTE CO., LTD., Westexe, Tiverton, Devon.—The nominal capital has been increased by the addition of £3,000 in £1 ordinary shares beyond the registered capital of £2,000.